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GEOLOGY AND GROUND-WATER RESOURCES OF LAWRENCE COUNTY, ALABAMA

A Reconnaissance

By Wiley F. Harris, Jr., and William M. McMaster

GEOLOGICAL SURVEY OF ALABAMA BULLETIN 78

GEOLOGICAL SURVEY OF ALABAMA

Philip E. LaMoreaux
State Geologist

DIVISION OF WATER RESOURCES

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Chief Hydraulic Engineer

BULLETIN 78

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A Reconnaissance

By Wiley F. Harris, Jr., and William M. McMaster

Prepared by the United States Geological Survey
in cooperation with the
Geological Survey of Alabama

UNIVERSITY, ALABAMA

1965

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University, Alabama
March 18, 1965

Honorable George C. Wallace
Governor of Alabama
Montgomery, Alabama

Dear Governor Wallace:

I have the honor to transmit the manuscript of a report entitled "Geology and Ground-Water Resources of Lawrence County, Alabama, a Reconnaissanc ' by Wiley F. Harris, Jr., and William M. McMaster, with a reque that it be printed as Bulletin 78 of the Geological Survey of Al ama.

The major aquifers in tl county are the Tuscumbia Limestone and Fort Payne Chert in the orthern part of the county, and the Bangor Limestone in the centra part. In some areas the Fort Payne, Tuscumbia, and Bangor re rtedly yield as much as 225 gallons per minute to individual we s. Small to moderate quantities of water, generally less than 20 llons per minute, are obtained from other geologic units in the county.

In general, ground water in Lawrence County is of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers in the county is generally soft to moderately hard, and water from limestone, chert, and shale aquifers is generally hard to very hard.

The ground-water studies required mapping the geology of the area and resulted in describing the different rocks and minerals such as limestone, dolomite, and shale—the basic raw materials for the cement, brick, and refractory industries. Thus, these studies assist in locating potential new mineral resources and aid industrial development.

Respectfully,

Philip E. LaMoreaux

Philip E. LaMoreaux
State Geologist

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GEOLOGY AND GROUND-WATER RESOURCES OF LAWRENCE COUNTY, ALABAMA

A Reconnaissance

By Wiley F. Harris, Jr. and William M. McMaster

ABSTRACT

Lawrence County, in northwestern Alabama, has an area of 700 square miles and a population of 24,299 according to the 1960 census. Moulton, the county seat and largest town, has a population of 1,668. The climate is humid and temperate; the mean annual temperature is 61° F and the average annual precipitation is about 50 inches.

Rocks exposed in Lawrence County consist primarily of limestone, sandstone, shale, and dolomite that range in age from Early Mississippian to Early Pennsylvanian. The regional dip of the strata is generally to the south and southwest about 20 to 40 feet per mile, except where altered by local structures. Formations mapped in Lawrence County are the Fort Payne Chert, Tuscumbia Limestone, Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Bangor Limestone, and Pennington Formation of Mississippian age; and the Pottsville Formation of Pennsylvanian age.

Major aquifers in the county are the Tuscumbia Limestone and Fort Payne Chert in the northern part of the county and the Bangor Limestone in the central part. In some areas the Fort Payne, Tuscumbia, and Bangor reportedly yield as much as 225 gpm (gallons per minute) to individual wells. Small to moderate quantities of water, generally less than 20 gpm, are obtained from other geologic units in the county.

In general, ground water in Lawrence County is of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers in the county is generally soft to moderately hard and water from limestone, chert, and shale aquifers is generally hard to very hard. Locally, objectionable quantities of hydrogen sulfide, iron, or carbon dioxide are reportedly obtained from wells tapping the Fort Payne Chert, the Tuscumbia and Bangor Limestones, the Hartselle Sandstone, and the Pottsville Formation.

INTRODUCTION

Lawrence County, in northwestern Alabama, has an area of 700 square miles and a population of 24,299 according to the 1960 census. Moulton, the county seat and largest town, has a population of 1,668. Other incorporated towns in the county are Town Creek, Courtland, and Hillsboro.

The economy of the county is based primarily on agriculture and cotton is the major agricultural product. Beef cattle, hogs, and grain are other important sources of income. Timber also is a major source of income. Most of the county's 220,000 woodland acres are in the William B. Bankhead National Forest in the southern third of the county.

PURPOSE OF INVESTIGATION

The U.S. Geological Survey, in cooperation with the Geological Survey of Alabama, began a reconnaissance in September 1960 of the ground-water resources of Lawrence County (fig. 1). The study was made to obtain sufficient data on the occurrence, availability, and chemical quality of ground water to aid future industrial, municipal, and domestic development of these resources in the county. The work was done under the direct supervision of W. J. Powell, district geologist, Ground Water Branch, U.S. Geological Survey.

PREVIOUS INVESTIGATIONS

One of the earliest geologic maps of Lawrence County was prepared by Smith (1894). Butts included geologic information for several units in the county in his study of the Paleozoic rocks of north Alabama, which was included in Geological Survey of Alabama Special Report 14, "Geology of Alabama," by G. I. Adams and others (1926). Accompanying the text was a revision of Smith's (1894) earlier geologic map of the State. Welch (1958) measured four geologic sections in Lawrence County as a part of his stratigraphic study of the Upper Mississippian rocks in northern Alabama and northeast Mississippi.

Johnston (1933) included an inventory of 39 wells and 7 springs, and chemical analyses of water from 3 wells and 2 springs in the

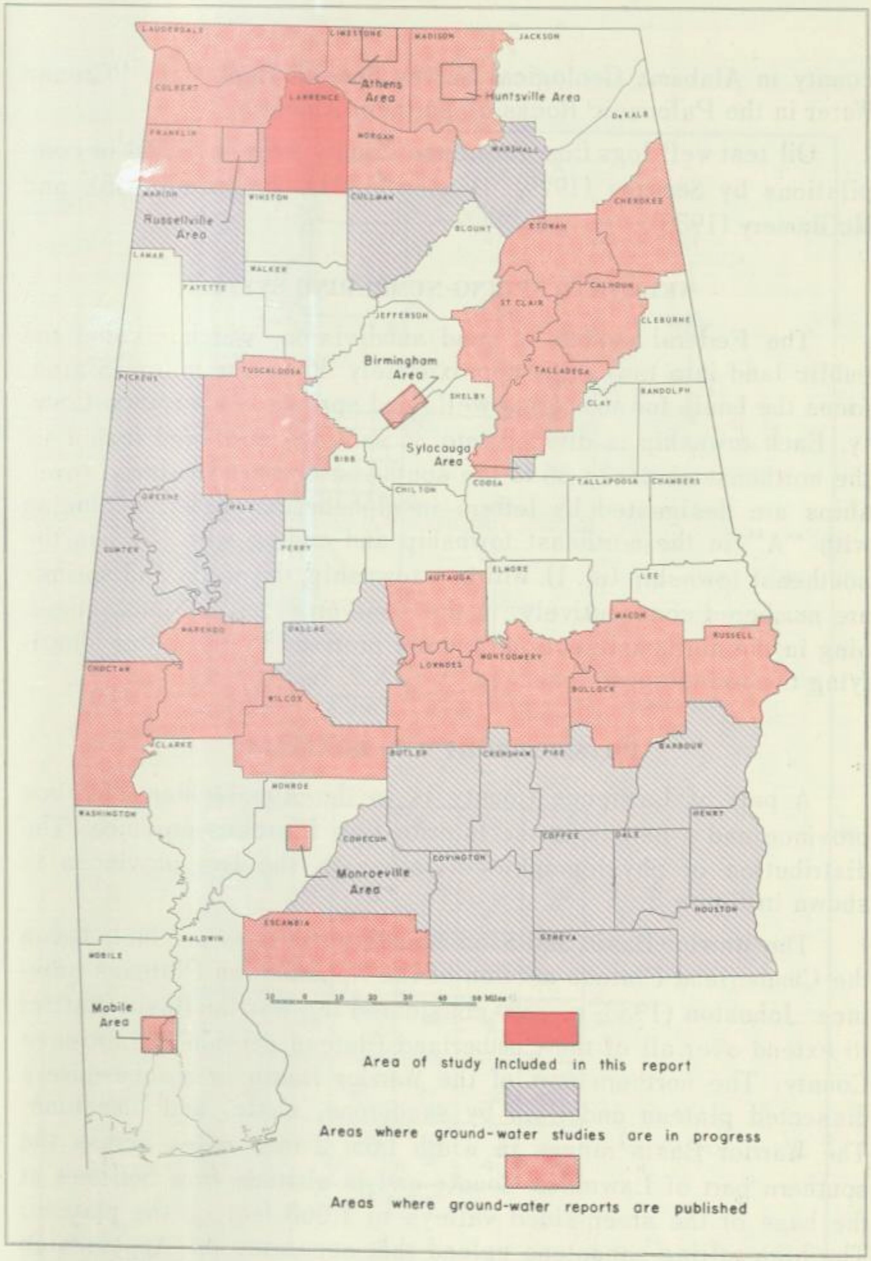

Figure 1.—Area studied and areas of other ground-water studies in Alabama.

county in Alabama Geological Survey Special Report 16, "Ground Water in the Paleozoic Rocks of Northern Alabama."

Oil test well logs from Lawrence County were included in compilations by Semmes (1929), Bowles (1941), Toulmin (1945), and McGlamery (1955).

WELL- AND SPRING-NUMBERING SYSTEM

The Federal system of land subdivision, which divided the public land into townships approximately 36 square miles in area, forms the basis for numbering wells and springs in Lawrence County. Each township is divided into 36 sections numbered from 1 in the northeast corner to 36 in the southeast corner. Similarly, townships are designated by letters in alphabetical order, beginning with "A" in the northeast township and ending with "X" in the southeast township (pl. 1). Within a township, the wells and springs are numbered consecutively, in the same order as sections, beginning in the northeast section, and are prefixed by the letter identifying the township; for example, N-1, N-2, N-3 (fig. 2).

PHYSIOGRAPHY AND DRAINAGE

A part of Lawrence County is in the Appalachian Plateaus province and a part is in the Interior Low Plateaus province. The distribution of physiographic divisions in the two provinces is shown in figure 3.

The Warrior Basin and Sand Mountain districts are included in the Cumberland Plateau section of the Appalachian Plateaus province. Johnston (1933, p. 255) considered the Warrior Basin district to extend over all of the Cumberland Plateau section in Lawrence County. The northern part of the Warrior Basin is a submaturely dissected plateau underlain by sandstone, shale, and limestone. The Warrior Basin ranges in width from 2 to 9 miles across the southern part of Lawrence County and in altitude from 560 feet at the base of the steep-sided valleys to 1,060 feet on the plateau. The high rolling sandstone upland that separates the Appalachian Plateaus and Interior Low Plateaus provinces is known in Lawrence and adjoining counties as Sand Mountain and is considered in this report as the Sand Mountain district—a separate topographic feature

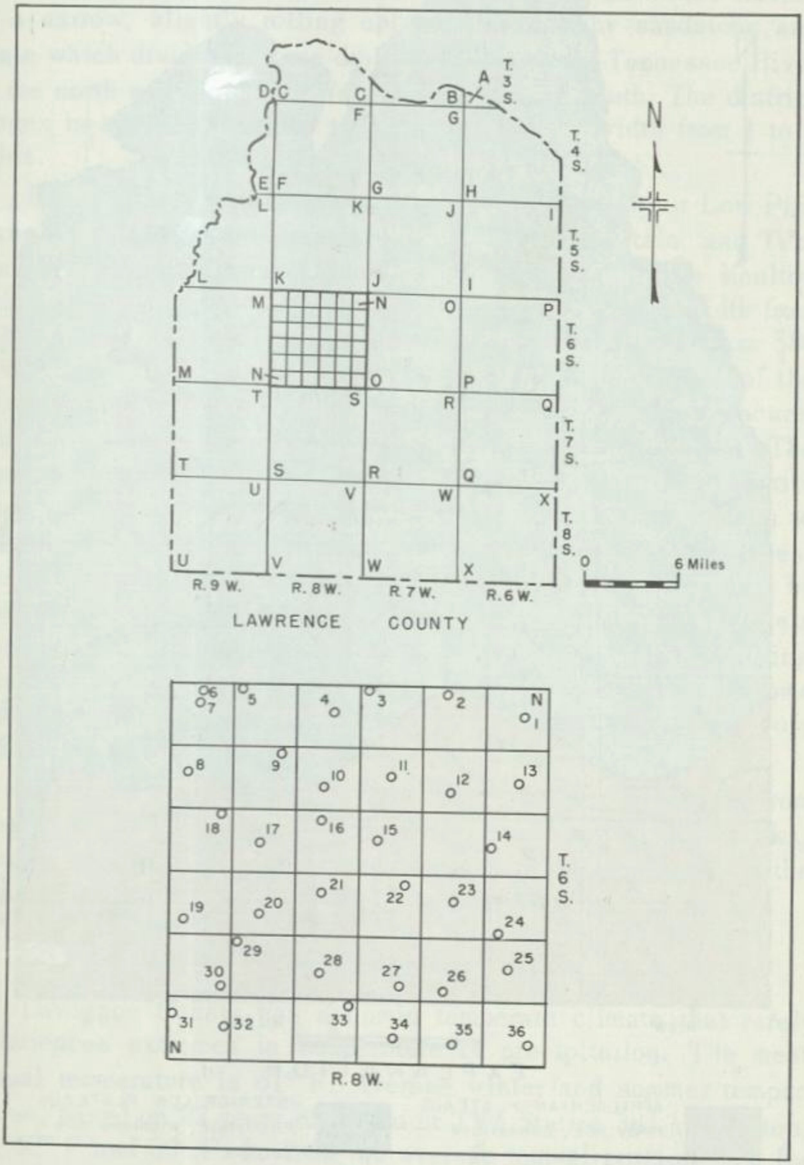

Figure 2.—Well- and spring-numbering system used in this report.

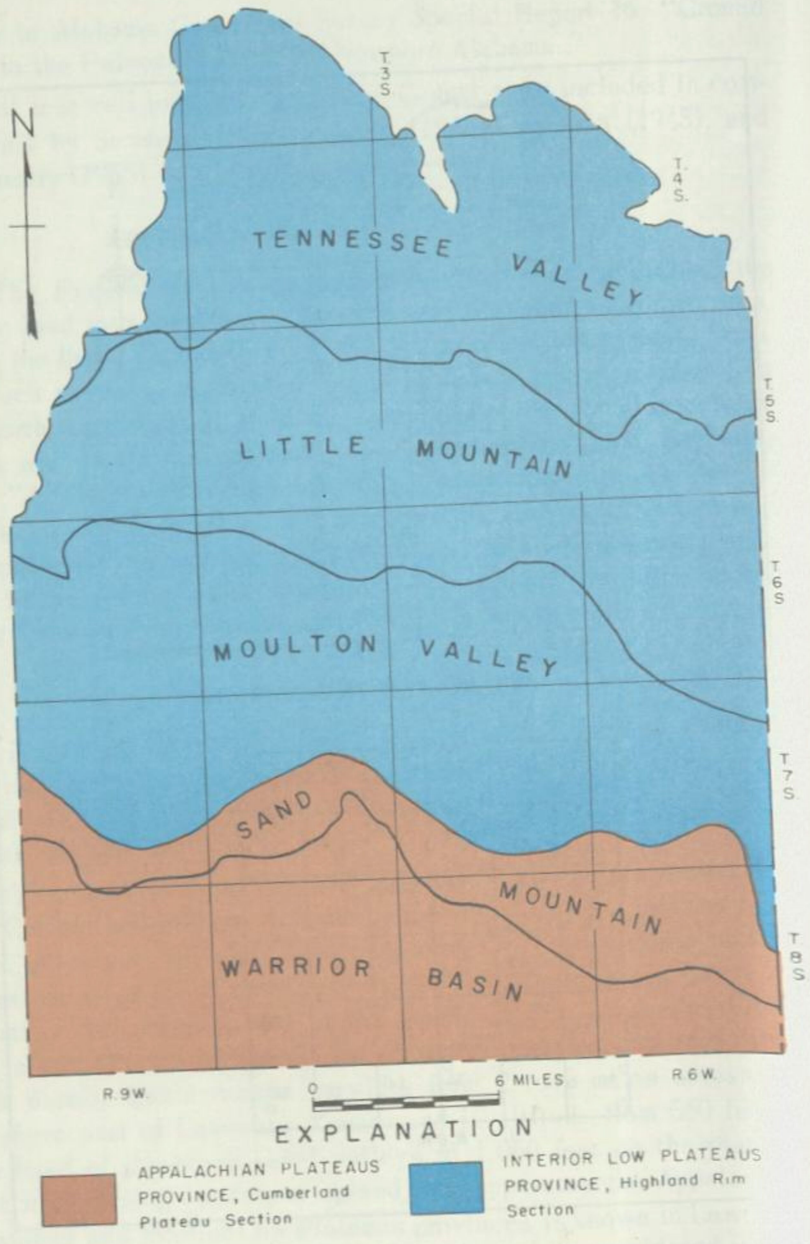

Figure 3.—Physiographic divisions of Lawrence County.

from Sand Mountain in Jackson, DeKalb, Marshall, Blount, and Etowah Counties. The Sand Mountain district in Lawrence County is a narrow, slightly rolling upland underlain by sandstone and shale which divides surface drainage between the Tennessee River to the north and the Black Warrior River to the south. The district ranges in altitude from 980 to 1,080 feet and in width from 1 to 5 miles.

Included in the Highland Rim section of the Interior Low Plateaus province are the Moulton Valley, Little Mountain, and Tennessee Valley districts (Johnston, 1933, p, 255). The Moulton Valley district is underlain by limestone and ranges in width from 4 to 8 miles. Its gently rolling surface ranges in altitude from 580 to 680 feet. North of the Moulton Valley, the hilly surface of the Little Mountain district is underlain by sandstone. A low escarpment forms the northern border of the Little Mountain district. The topography slopes southward from this escarpment. The district ranges in altitude from 600 feet in its incised stream valleys to 850 feet on its upland plateaus, and in width from 4 to 10 miles. The Tennessee Valley district in Lawrence County is underlain by limestone. It extends from the northern margin of the Little Mountain district to the Tennessee River. The district is a gently rolling area of low relief ranging in altitude from 510 to 650 feet. In some parts of the district a Karst topography has developed where roofs of solution cavities have collapsed to form sinks.

Major streams which drain into the Tennessee River are, from west to east, Town, Big Nance, Mallard, and West Flint Creeks. Borden, Bushy Fork, and Capsey Creeks drain southward to the Sipsey River in the Warrior Basin.

CLIMATE

Lawrence County has a humid temperate climate that rarely experiences extremes in temperature or precipitation. The mean annual temperature is 61° F. Average winter and summer temperatures, based on 22 years of record at TVA Station 381 at Moulton, are 42° F and 80° F. In 1960 the average annual precipitation for the 22-year period of record at Moulton was 48.26 inches. Based

on 25 years of record at TVA Station 52 at Wheeler Dam, the average annual precipitation was 51.70 inches. The length of the growing season is approximately 200 days.

ACKNOWLEDGMENTS

Appreciation is expressed to residents of the county who furnished information on wells and springs, use of water, and other data relative to the investigation. Acknowledgment is made to Messrs. Jesse Jeffreys, E. M. Edwards, and J. S. Blakemore, Water Works Superintendents for the towns of Town Creek, Courtland, and Moulton, respectively, for supplying pumpage data. Special thanks for well logs and samples are extended to local well drillers A. J. Hare, Johnnie Harris, and S. T. Little and to the Adams-Massey Drilling Co., Carrollton, Ga.; Crowe Drilling Co., Hartselle, Ala.; Gifford Miller Drilling Co., Lawrenceburg, Tenn.; and the H. W. Peerson Drilling Supply Co., Birmingham, Ala.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

GENERAL STRATIGRAPHY

Rocks cropping out in Lawrence County consist primarily of limestone, sandstone, shale, and dolomite that range in age from Early Mississippian to Early Pennsylvanian. The formations mapped include the Fort Payne Chert, Tuscumbia Limestone, Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Bangor Limestone, and Pennington Formation, all of Mississippian age; and the Pottsville Formation of Pennsylvanian age (pl. 2). A generalized section of these formations, giving their thickness, description, and water-bearing characteristics, is given in table 1.

The Fort Payne Chert is underlain successively by the Chattanooga Shale of Devonian age, limestone and shale beds of Silurian age, and the Chickamauga Limestone of Middle and Late Ordovician age. The Chattanooga Shale, being relatively impermeable, yields little or no water to wells in Lawrence County. Permeable beds underlying the formation generally contain highly mineralized water

and the top of the Chattanooga is considered the lower limit of occurrence of usable ground water in Lawrence County.

GENERAL STRUCTURE

Lawrence County is on the south flank of the Nashville dome. In the northern third of the county the strata dip south and southwest about 20 feet per mile and in the southern two-thirds of the county the dip is about 40 feet per mile in most areas. The regional dip is modified locally by minor structures. The configuration of the top of the Chattanooga Shale is shown on plate 3.

Depressions caused by rock collapse are common secondary structural features in many places along the northern margins of the belts of outcrop of the Hartselle Sandstone and the Pottsville Formation (pl. 2). Beds of sandstone in the Hartselle and Pottsville have slumped into cavities in the underlying limestones.

MISSISSIPPIAN SYSTEM

FORT PAYNE CHERT

The Fort Payne Chert is exposed in Lawrence County along the lower part of the bluff on the south bank of the Tennessee River and in Town and Big Nance Creeks (pl. 2). The average thickness of the formation in the county is about 180 feet. The formation is composed of siliceous limestone interbedded with dolomite, dolomitic limestone, shale, and chert. Limestone of the formation is typically light gray, crystalline, siliceous, and thin bedded to massive. The dolomite is light gray and finely crystalline and the shale is blue green and clayey. Chert in the Fort Payne is very light to light gray, opaque, and weathers yellow brown. At Courtland the formation yields an estimated 50,000 gpd (gallons per day) to municipal well G-31. On July 17, 1959, the reported drawdown in the well was 90 feet after pumping 200 gpm (gallons per minute) for several hours. During World War II, Courtland Air Base was supplied by two wells tapping Fort Payne aquifers. Several domestic wells tapping the formation in the county are reported to yield sulfurous water. The results of chemical analyses determined for water samples collected from 34 wells obtaining water

Table 1.—*Generalized section of the geologic units in Lawrence County, Ala., and their water-bearing properties*

System	Geologic unit	Thickness (feet)	Rock character	Water-bearing properties
Post-Pennsylvanian undifferentiated		0-90	Alluvial and residual clay, silt, sand, and gravel.	Locally yields sufficient water for domestic and stock use. Clay and chert gravels weathered from limestone yield a maximum of about 50 gpm to wells. Water is generally soft to moderately hard.
Pennsylvanian	Pottsville Formation	300±	Sandstone, gray, medium- to coarse-grained, medium-bedded to massive; interbedded with gray fissile shale. A conglomerate occurs near the base of the formation in some areas.	Generally yields less than 10 gpm of soft water to wells and springs. The water reportedly contains objectionable amounts of iron in several areas.
	Pennington Formation	60-140	Limestone, gray, oolitic, variable in bedding character, clayey; interbedded with shale.	Generally yields small to moderate quantities of water to springs, however, it has not been extensively developed as a source of water supply. Limited data indicate that the water is soft to moderately hard.
	Bangor Limestone	445	Limestone, medium-gray, finely crystalline, oolitic, partly fossiliferous, massive, interbedded with light-green and gray fissile shale. Upper part includes some light- to medium-gray massive chert and light-gray thin-bedded dolomitic limestone.	Wells tapping openings in the formation reportedly yield as much as 225 gpm and springs discharge as much as 2,000 gpm. Wells obtaining the largest yields are developed near the contact with the underlying Hartselle Sandstone. Water is generally very hard and is reported to be sulfurous in some areas.

Mississippian	Hartselle Sandstone	35-165	Sandstone, light-gray, medium- to coarse-grained, medium-bedded to massive, calcareous, asphaltic in places; locally includes beds of shale and limestone in the lower part.	Yields less than 10 gpm to wells and springs. Water is generally soft or moderately hard and is reported to contain hydrogen sulfide, iron, and carbon dioxide in several areas.
	Gasper Formation and Ste. Genevieve Limestone undifferentiated	110-230	Shale, medium- and olive-gray, calcareous in the western part of the county; very light to medium-gray finely crystalline or oolitic slightly cherty massive to irregularly bedded limestone interbedded with light- to medium-gray calcareous shale in the eastern part of the county.	Yields to wells and springs are generally less than 10 gpm. Water is generally hard or very hard and is reported to contain objectionable quantities of hydrogen sulfide and carbon dioxide in some areas.
	Tuscumbia Limestone	200	Limestone, gray, coarsely crystalline, massive; contains chert beds.	Wells tapping cavities and fractures in the formation reportedly yield as much as 150 gpm. Larger yields are probably available in some areas. Springs yield as much as 1,000 gpm. Water is generally hard or very hard and locally is reported to contain objectionable sulfurous traits.
	Fort Payne Chert	180	Limestone, light-gray, crystalline, siliceous, thin-bedded to massive; interbedded with dolomite, dolomitic limestone, shale, and chert.	Wells tapping cavities and fractures in the formation reportedly yield as much as 200 gpm. The water is generally moderately hard to very hard and locally is reported to contain objectionable sulfurous traits.

from the Fort Payne Chert indicate that the water is moderately hard or hard and has a median chloride content of 11 ppm (parts per million).

TUSCUMBIA LIMESTONE

The Tuscumbia Limestone overlies the Fort Payne Chert and crops out in an irregular belt 4 to 9 miles wide across the northern part of the county (pl. 2). The average thickness of the Tuscumbia in Lawrence County is about 200 feet. The limestone is generally gray, coarsely crystalline, massive, and contains beds of chert. Limestone has been quarried from the Tuscumbia for road metal but the quarries were abandoned because of problems of drainage. Town Creek is supplied by well F-20, which taps the Tuscumbia and reportedly yields 50,000 gpd. In the summer of 1937, well F-20 had a reported slight drawdown after pumping 150 gpm for 24 hours. Springs flowing from the Tuscumbia range in yield from less than 10 to 1,000 gpm. Wheeler Spring (G-39) at Wheeler, Ala., was estimated to flow 400 gpm on September 28, 1960. The spring formerly supplied a watering tower for steam locomotives. Among several reportedly large springs flowing from the Tuscumbia, but now covered by Wheeler Reservoir, are Big Head Spring, which is covered by backwater in Spring Creek, and a spring covered by backwater in Swoope Lake. Sulfurous water is reportedly obtained from wells tapping the Tuscumbia in some areas. The results of chemical analyses determined for water samples collected from 88 wells and springs obtaining water from the Tuscumbia Limestone indicate that the water is hard or very hard and low in chloride content (median 11 ppm).

GASPER FORMATION AND STE. GENEVIEVE LIMESTONE UNDIFFERENTIATED

Stratigraphic units from the top of the Tuscumbia Limestone to the base of the Hartselle Sandstone were studied by Welch (1958) in his report on the Upper Mississippian rocks of north Alabama and northeast Mississippi. The rocks described by Butts (1926, p. 177-189) as the Gasper Formation and the Ste. Genevieve Limestone were renamed the Pride Mountain Formation by Welch, who traced several members, which he named, from his type section in

Colbert County into the western part of Lawrence County. These members are not identifiable in the eastern part of Lawrence County; therefore, Butts' terminology is retained in this report. The Gasper Formation and Ste. Genevieve Limestone were not separately identified in Lawrence County.

The Gasper Formation and Ste. Genevieve Limestone undifferentiated crops out on the north slope of the Little Mountain escarpment, which extends in an east-west direction across the county. The lithology of the Gasper in the eastern part of the county is chiefly limestone and shale; however, in the western part it is predominantly shale. Accompanying this change is an increase in the thickness of the formations from east to west. The formations range in thickness from 110 feet in the Goyer no. 1 well (Semmes, 1929, p. 131-132) in the SW¼SE¼ sec. 29, T. 7 S., R. 6 W., to 230 feet in the Connors no. 1 well (Toulmin, 1945, p. 92-94) in the NE¼NE¼ sec. 17, T. 5 S. R 8 W.

The limestone is very light to medium gray, finely crystalline or oolitic, slightly cherty, and massive to irregularly bedded. In the eastern part of Lawrence County, shale is interbedded with the limestone and is light to medium gray and calcareous. In the western part of Lawrence County, the shale beds are medium and olive gray and calcareous. Sandstone occurs near the base of the formations and lenses out to the east. Welch (1958, section 19) describes a thin-bedded sandstone lens in sec. 10, T. 5 S., R. 7 W. The sandstone is light olive gray, very fine to fine grained, thin bedded, and lenticular. Several small road metal quarrying operations in limestone beds in the formations in Lawrence County have been discontinued. In many areas conditions are unfavorable for extensive quarrying because of solution of the limestone by circulating ground water and the consequent collapse of the overlying Hartselle Sandstone.

Yields to wells and springs tapping openings in the limestone or discharging from them are generally less than 10 gpm. Hydrogen sulfide and carbon dioxide were reported in water from the formations in many parts of the county. The results of chemical analyses determined for water samples collected from 38 wells and springs obtaining water from the Gasper Formation and Ste. Genevieve

Limestone undifferentiated indicate that the water is hard or very hard and low in chloride content (median 18 ppm).

HARTSELLE SANDSTONE

The Hartselle Sandstone crops out in an irregular band 4 to 10 miles wide across the central part of the county (pl. 2). It forms an escarpment and caps Little Mountain. The Hartselle generally ranges in thickness from 35 to 165 feet and averages about 105 feet. The sandstone is typically light gray weathering to yellow brown, medium to coarse grained, medium bedded to massive, calcareous, and locally is asphaltic. Beds of shale and limestone occur locally in the lower part of the formation. The most extensive asphalt impregnations observed in the sandstone are at Wolf Springs in sec. 15, T. 5 S., R. 9 W., and in sec. 35, T. 5 S., R. 6 W. Wells L-11, N-6, N-7, and O-30 penetrated asphalt zones in the sandstone. The Hartselle generally yields less than 10 gpm to wells and springs. The water was reported to contain hydrogen sulfide, iron, and carbon dioxide in several areas. The results of chemical analyses determined for water samples collected from 143 wells and springs obtaining water from the Hartselle Sandstone indicate that the water is soft to moderately hard and low in chloride content (median 18 ppm).

BANGOR LIMESTONE

The Bangor Limestone crops out north of Sand Mountain in an east-west trending belt 5 to 10 miles wide across the county (pl. 2). The thickness of the Bangor penetrated in the no. 1 United States of America oil test well in the SE¼SE¼ sec. 26, T. 7 S., R. 8 W. was 445 feet. This thickness is believed to be representative of that of the formation in other parts of the county. The Bangor contains medium-gray finely crystalline oolitic partly fossiliferous massive limestone, with some shale, chert, and dolomitic limestone. The shale is light green and gray, fissile, and discontinuous; it occurs throughout the formation. The chert is light to medium gray and weathers yellow brown, and is massive. The dolomitic limestone is light gray and thin bedded and is interbedded with limestone and chert in the upper part of the formation. The uppermost bed of dolomitic limestone is the key to recognition of the

contact between the Bangor and the overlying Pennington Formation. The formation is quarried for road metal in sec. 25, T. 7 S., R. 6 W., near the Morgan-Lawrence County boundary and in sec. 30, T. 6 S., R. 8 W., 2 miles northwest of Moulton.

Municipal wells O-36 and R-5 in Moulton yield a combined average of 150,000 gpd from the formation. Well O-36 had a reported drawdown of 21 feet after pumping 210 gpm for 24 hours on July 8, 1954, and well R-5 had a reported drawdown of 37 feet after pumping 225 gpm for 27½ hours on December 15, 1947. Drillers' logs indicate that the greatest quantity of water in the Bangor is generally available at or near its contact with the underlying Hartselle Sandstone. Springs flowing from the Bangor generally range in yield from 20 to 2,000 gpm.

Sulfurous water is reportedly obtained from numerous wells tapping the Bangor. The results of chemical analyses determined for water samples collected from 143 wells and springs obtaining water from the Bangor Limestone indicate that the water is very hard; 28 percent had hardnesses exceeding 300 ppm. The median chloride content was 25 ppm.

PENNINGTON FORMATION

The Pennington Formation crops out on the north slope of Sand Mountain (pl. 2). The formation generally ranges in thickness from 60 to 140 feet and averages about 84 feet. Limestone in the Pennington is gray, oolitic, clayey, and is variable in bedding character. In many areas the limestone is interbedded with shale that, in places, is red and green at the base of the formation. Some limestone in the formation has been mined for road metal, however, the quarries were not active in 1962. The Pennington generally yields small to moderate quantities of water to springs; however, the formation has not been extensively developed as a source of water supply. The results of chemical analyses determined for three water samples from the Pennington indicate that the water is soft to moderately hard and low in chloride content.

PENNSYLVANIAN SYSTEM

POTTSVILLE FORMATION

The Pottsville Formation overlies the Pennington Formation and crops out in the southern part of Lawrence County (pl. 2). The maximum thickness of the Pottsville is about 300 feet along Borden Creek near the Winston-Lawrence County boundary. The Pottsville is composed of sandstone and shale. The sandstone is typically gray weathering to yellow brown, medium to coarse grained, medium bedded to massive, and interbedded with gray fissile shale. A conglomerate that weathers to a sand and gravel residuum occurs near the base of the formation in some areas. The residuum has been mapped previously as the Tuscaloosa Group of Cretaceous age because of its lithology (Adams and others, 1926). The Pottsville generally yields less than 10 gpm to wells and springs. Owners of wells tapping the Pottsville in several areas report that the water contains objectionable amounts of iron. The results of chemical analyses determined for water samples collected from 30 wells and springs obtaining water from the Pottsville Formation indicate that the water is soft and low in chloride content (median 18 ppm).

POST-PENNSYLVANIAN UNDIFFERENTIATED

Alluvium and residuum of post-Pennsylvanian age overlie bedrock in most of Lawrence County. Thin alluvial deposits are present in basins of the larger tributaries and the residuum, the leached remains of underlying bedrock, overlies formations from which it has weathered. These deposits, because of their indistinct nature and limited thickness in places, were not mapped separately from other geologic units in the county. The residual deposits are as much as 90 feet thick in the outcrop area of the Tuscumbia Limestone and are thinnest, where present, in the outcrop areas of the more resistant beds in the Pottsville Formation and Hartselle Sandstone. Sandstone beds in the Pottsville and Hartselle are at or near the land surface in numerous areas on Sand and Little Mountains. Alluvial sand and gravel deposits locally yield enough water for domestic and stock use. Residual clay, silt, sand, and gravel weathered from the sandstone formations yield some water to wells. Clay weathered from shale yields little or no water to

wells. Chert gravel weathered from limestone yields a maximum of about 50 gpm to wells F-19 and F-24. The median hardness and chloride content determined for 54 water samples collected from the post-Pennsylvanian deposits was 92 and 18 ppm.

GROUND WATER

SOURCE

The source of ground water in Lawrence County is precipitation consisting of rainfall and an occasional light snowfall. A part of the precipitation runs off by surface drainage, a part evaporates or is transpired by plants, a part replenishes soil moisture, and a part moves downward by influent seepage into the earth to the zone of saturation; the zone in which all pore spaces and voids in the rock are filled with water.

OCCURRENCE AND STORAGE

Ground water is water in the zone of saturation. The upper surface of this zone is called the water table. Shallow unconfined ground water is under water-table conditions; it moves from higher to lower altitudes in response to gravity. As water in an aquifer moves downward between relatively impermeable beds of shale, dolomite, and limestone, it is generally confined under pressure exerted by water in the same aquifer at higher altitudes and is called artesian water. Water in a well penetrating the confining layer will rise above the base of the confining bed in response to pressure in the artesian aquifer. If the altitude to which the water will rise under this pressure is above that of the land surface, the well will flow. Well S-6 (pl. 1) is an artesian well that flows during periods of maximum rainfall.

Water occurs in limestone in solution cavities developed along fractures and bedding planes. Water occurs in sandstone in interstices, fractures, and along bedding planes. The quantity of water that an aquifer will yield is dependent on the porosity, or percentage of open space in a rock, and the permeability, or rate at which the aquifer can transmit water. Sandstone porosity is controlled by the shape, sorting, cementation, and compaction of the constituent

particles. Limestone porosity is dependent on the extent to which mineral matter has been removed through solution by percolating water, and on the number of joints and fractures in the rock.

RECHARGE

The water table declines during periods of little or no precipitation when discharge from ground-water reservoirs exceeds recharge. The amount of water that reaches the water table and recharges ground-water reservoirs is determined by the intensity and duration of precipitation, the slope of the land surface, the porosity and permeability of the soil, and the vegetative cover. The surface slopes of the Little Mountain, Sand Mountain, and Warrior Basin physiographic districts (fig. 3) are relatively steep, which allows precipitation only a short period of access to the underlying rock formations before draining into nearby tributaries. In the Tennessee Valley and Moulton Valley physiographic districts (fig. 3), surface slopes are gentle, allowing precipitation a longer period of access to the underlying formations. Also, larger quantities of recharge are received by aquifers in these districts because of the easy access to the subsurface provided by sinkholes formed by the collapse of solution cavities in underlying limestone.

WATER-LEVEL FLUCTUATIONS AND THEIR SIGNIFICANCE

Water-level fluctuations generally can be correlated with recharge or lack of recharge to the ground-water reservoirs, withdrawals by pumping, flows from wells and springs, variations in atmospheric pressure, ocean and earth tides, earthquakes, and other minor phenomena. Fluctuations in Lawrence County, for the most part, are seasonal or cyclic and are related directly to precipitation. The highest amplitude of seasonal fluctuation occurs in aquifers in the Tuscumbia Limestone and Fort Payne Chert. Smaller amplitudes occur in aquifers in the Hartselle Sandstone, Bangor Limestone, and post-Pennsylvanian deposits. Water levels reflecting seasonal changes in precipitation are normally lowest in the fall when precipitation is low and evaporation and transpiration rates are high. Water levels are normally highest in the late winter and spring because of an increase in precipitation.

Water-level fluctuations in wells F-32, F-37, G-28, and H-16 from September 1960 to August 1961 are shown in figure 4. Water-level measurements and precipitation totals for 14-day intervals are plotted to show their relationship. The hydrographs reflect chiefly the seasonal recharge from precipitation. Water-level lows for all but well G-28 were recorded in September 1960. Well G-28, which develops water from alluvial gravel deposits in the vicinity of Big Nance Creek, showed a fluctuation of 13 feet from November 30, 1960, to January 25, 1961. Smaller amplitudes in seasonal fluctuations for wells N-5, O-33, P-3, and Q-28 in response to precipitation are shown in figure 5. Well N-5, a low-yield well, also reflects withdrawals. The hydrograph for well O-33 is based on daily water-level lows. Hydrographs for wells N-5, P-3, and Q-28 are based on measurements taken at 14-day intervals. Excessive rainfall in September 1960 in the Moulton area caused water levels to be higher than normal in wells O-33, P-3, and Q-28. Figure 6 shows water-level fluctuations in wells R-23, S-6, and T-9 from September 1960 to August 1961. Water levels in well R-23, a low-yield well, reflect withdrawal in addition to seasonal variations in precipitation. Well S-6 is in an area of artesian flow from the Bangor Limestone. Water levels in wells S-6 and T-9 fluctuate primarily in response to seasonal changes in precipitation. Water-level lows for wells R-23 and T-9 for the period of record occurred in September 1960 and for well S-6 occurred in May and June 1961.

USE OF WATER

Moulton, Town Creek, and Courtland obtain municipal water supplies from drilled wells. Wells O-36 and R-5 supply Moulton with an average of 150,000 gpd. Well F-20 supplies Town Creek with an estimated average of 50,000 gpd. Wells G-31 and G-32 supply Courtland with an estimated average of 80,000 gpd. Per capita water consumption during 1960 in Moulton, Town Creek, and Courtland was 114, 60, and 160 gpd, respectively. Per capita water consumption for Moulton and Courtland are higher than Town Creek because of industrial use at Moulton.

Thirty percent of the domestic and stock wells are equipped with electric pumps; water is obtained manually from the remainder (table 4). Because of the large number of wells in rural areas where

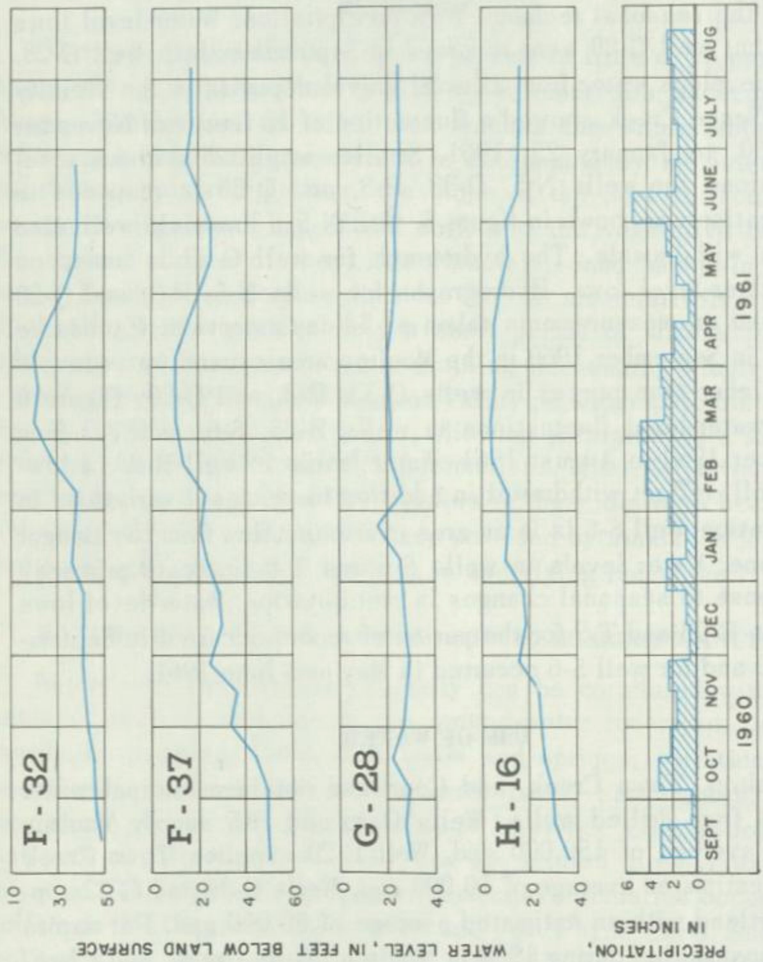

Figure 4.—Fluctuations in water level in wells F-32, F-37, G-28, and H-16 and precipitation at Wheeler Dam, 1960-61.

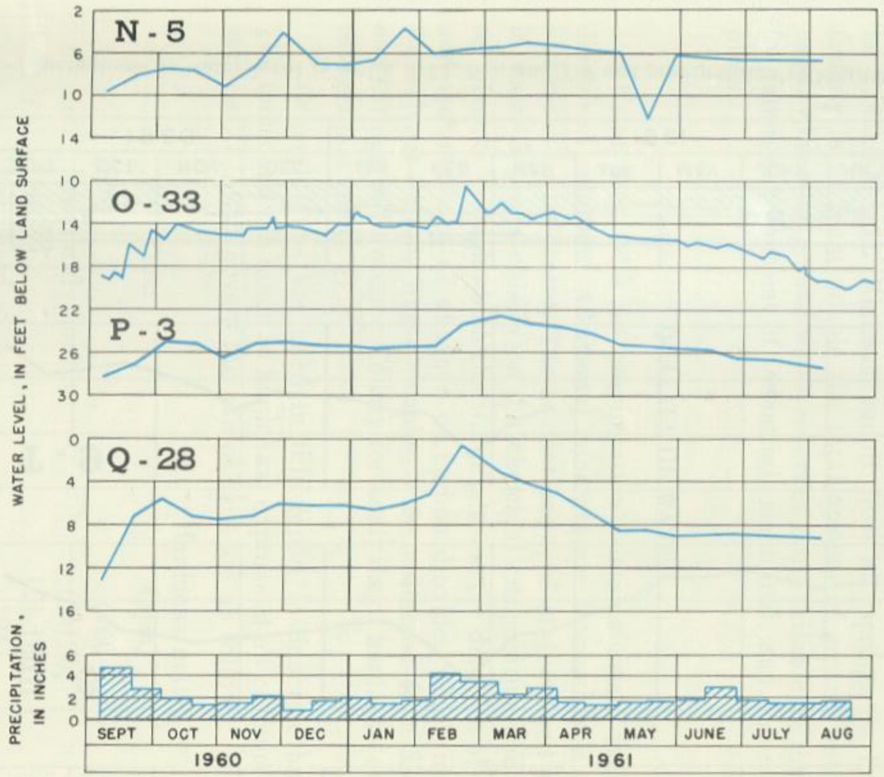

Figure 5.—Fluctuations in water level in wells N-5, O-33, P-3, and Q-28 and precipitation at Moulton, 1960-61.

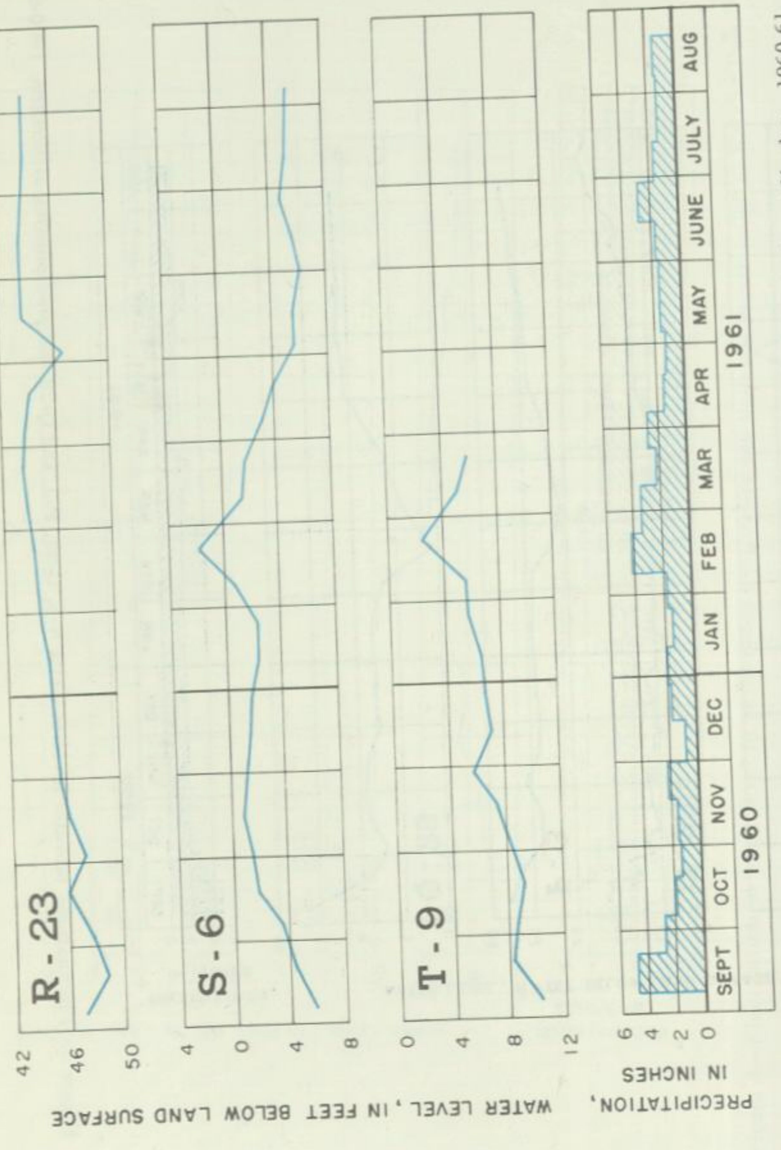

Figure 6.—Fluctuations in water level in wells R-23, S-6, and T-9 and precipitation at Moulton, 1960-61.

water is obtained manually, the lower per capita rate of water consumption at Town Creek, 60 gpd, is used to estimate the average per capita rate for Lawrence County. Based on this rate of consumption, about 1,500,000 gpd is used in Lawrence County. Estimated minimum yield for 28 springs inventoried in Lawrence County is 2,000,000 gpd. Minimum runoff from all springs in Lawrence County is at least double the total amount of ground water being used. Abundant ground-water reserves are available in the county for future development of industrial, municipal, and domestic supplies.

QUALITY OF WATER

Water that falls as precipitation contains small amounts of dissolved minerals. Additional minerals are leached from the soil and rocks by the water. The amount and type of dissolved minerals in water depends chiefly on the chemical composition and character of rocks through which the water passes, the duration of contact, and the presence or absence of carbon dioxide, which increases its solvent action. Water samples were collected from 533 wells and springs in Lawrence County for analysis of hardness and chloride content (table 2).

General terms are used in this report to describe hardness. The terms and the range in hardness, expressed as calcium carbonate ($CaCO_3$), that govern the use of each are as follows:

Term	Hardness range (ppm)
Soft	0-60
Moderately hard	61-120
Hard	121-180
Very hard	181+

The hardness of ground water generally varies with the type of rock the water is stored in. The Hartselle Sandstone and Pottsville Formation are comprised chiefly of sandstone aquifers and the remainder of the formations in Lawrence County, with the exception of unconsolidated alluvial and residual deposits, are comprised of limestone, chert, and shale aquifers. Of the 173 water samples collected from sandstone aquifers and analyzed, about 50

percent contained soft water and about 25 percent contained moderately hard water (fig. 7). Of 303 water samples collected from limestone, chert, and shale aquifers, about 65 percent contained very hard water and about 25 percent contained hard water. Analyses of 54 water samples from wells completed in beds of sand and gravel in alluvium and residuum indicate that soft to moderately hard water is obtained from about 60 percent of the wells. Bar graphs showing distribution of hardnesses determined from samples collected from the various formations are shown in figure 8. Maximum, median, and minimum values of hardness and chloride content are shown in table 2 for each formation that crops out in the county. Median values of hardness range from 40 to 246 ppm.

Laboratory analyses of water samples from municipal wells O-36 in Moulton, F-20 in Town Creek, and G-32 in Courtland are shown in table 3. The U.S. Public Health Service (1962) drinking water standards indicate domestic and municipal supplies preferably should not contain more than 0.3 ppm of iron, 0.05 ppm of manganese, 250 ppm of sulfate, 250 ppm of chloride, from 0.8 to 1.7 ppm of fluoride, 45 ppm of nitrate, and 500 ppm of dissolved solids. Analyses in table 3 indicate that the standards for dissolved solids were exceeded in the sample from Town Creek, and standards for iron were exceeded in the sample from Moulton. The iron content of the sample from Courtland was equal to the recommended maximum amount. The sulfate content of the sample from Town Creek was moderately high, but well below the recommended maximum amount. There is no sulfurous taste or odor in water from the municipal system in Town Creek.

Chloride is present in all natural waters and in Lawrence County the amounts are generally very small. Locally, water obtained from a few wells contains sufficient chloride to give it an objectionable taste. Median values of chloride content in Lawrence County range from 7 to 25 ppm (table 2).

Ground water obtained from wells and springs in Lawrence County generally ranges in temperature from 62° to 64° F.

Objectionable quantities of iron, hydrogen sulfide, and carbon dioxide were reported to occur locally in ground water from wells tapping the Hartselle Sandstone. Sulfurous water also was reportedly

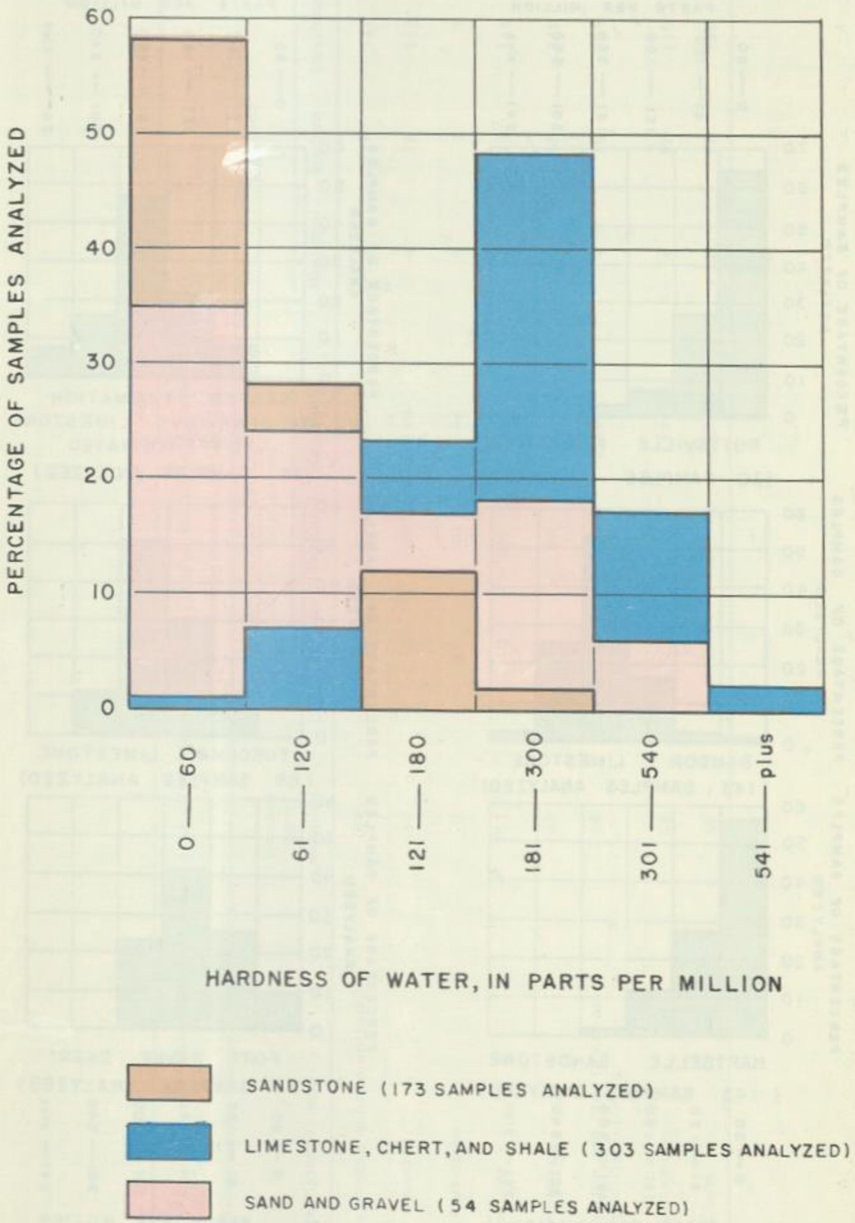

Figure 7.—Hardness of ground water from the various types of rocks in Lawrence County.

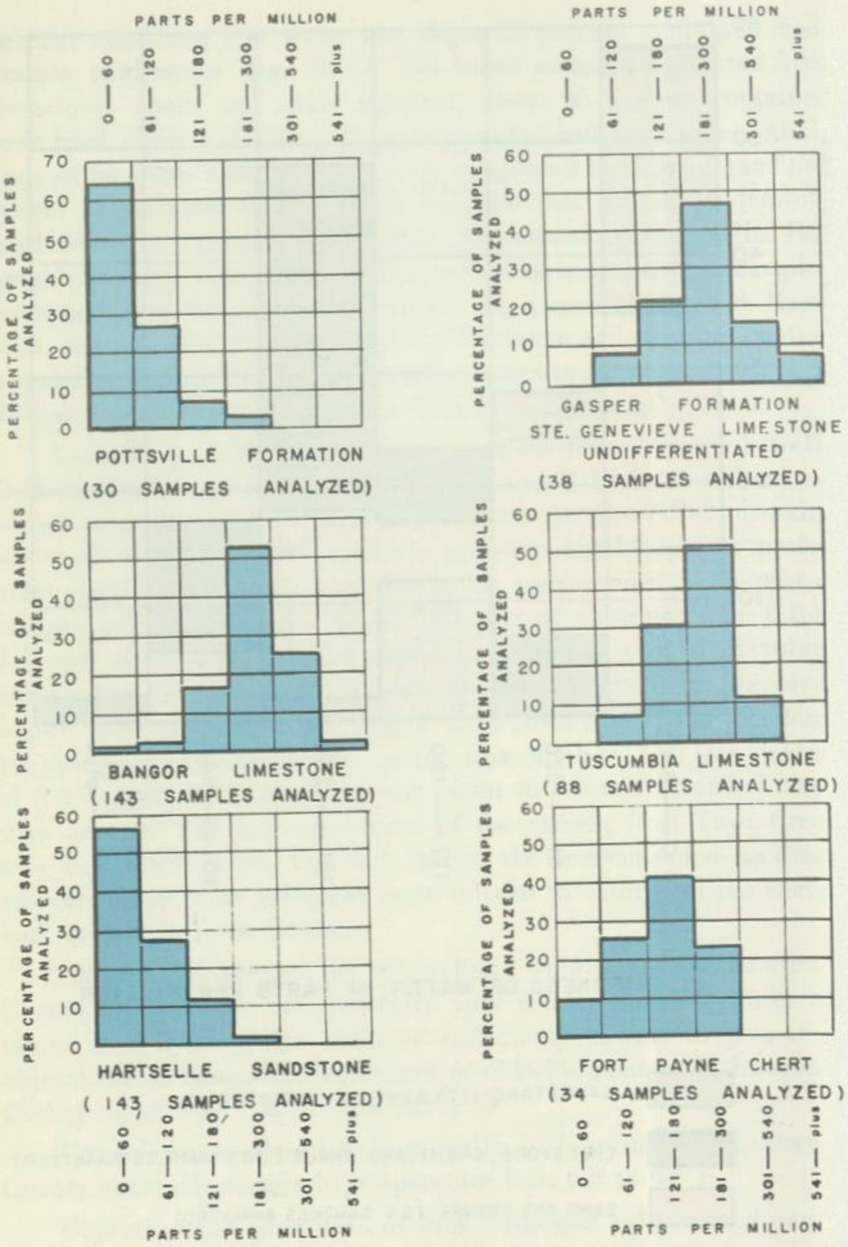

Figure 8.—Hardness of ground water by formations in Lawrence County.

Table 2.–*Hardness and chloride content of ground water in Lawrence County*

Stratigraphic unit	Number of samples	Hardness as $CaCO_3$ Calcium, magnesium			Chloride (Cl)		
		Minimum	Median	Maximum	Minimum	Median	Maximum
Post-Pennsylvanian undifferentiated	54	16	92	352	7	18	117
Pottsville Formation	30	8	40	158	4	18	117
Pennington Formation	3	56	60	96	7	7	7
Bangor Limestone	143	40	246	1,310	4	25	145
Hartselle Sandstone	143	6	46	254	4	18	248
Gasper Formation and Ste. Genevieve Limestone undifferentiated	38	90	240	2,480	4	18	273
Tuscumbia Limestone	88	92	204	434	4	11	110
Fort Payne Chert	34	20	136	296	2	11	188

Table 3.—*Chemical analyses of water from municipal wells in Lawrence County*

Well	Date of collection	Water-bearing unit	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Phosphate (PO_4)	Dissolved solids	Hardness as $CaCO_3$		Free carbon dioxide (CO_2)	pH
			Parts per million																Total	Non-carbonate		
[1] F-20	10- 5-59	Mt-Mfp	10.0	nil	nil	..	82.9	....	11.5	0.1	317.2	0	105.4	10.7	....	nil	nil	547.0	231.4	.....	23.7	7.1
[2] G-32	12-15-53	Mfp	9.4	0.6	0.3	0	31.4	15.6	18.4	2.2	207.4	0	2.1	12.0	tr	0.03	tr	303.0	146.4	142.6	4.4	7.8
[1] O-36	7-12-54	Mb-Mh	12.3	...	.7	..	23.2	16.3	45.5	....	106.4	0	5.3	5.3	....	....	...	228.0	127.7	.....	14.0	7.6

[1] Southern Testing Laboratories, Inc.
[2] Picard Testing Laboratories, Inc.

obtained from wells tapping the Fort Payne Chert and the Tuscumbia and Bangor Limestones in some areas. The water from wells tapping the Pottsville Formation in several areas is reported to contain objectionable quantities of iron. Several domestic wells reportedly yield small quantities of gas and related petroliferous material from the Hartselle Sandstone.

SUMMARY AND CONCLUSIONS

Major aquifers yielding water to wells in Lawrence County are the Fort Payne Chert and the Tuscumbia and Bangor Limestones. The Fort Payne Chert yields as much as 200 gpm to wells in some areas. Wells tapping the Tuscumbia Limestone in the northern part of the county may yield as much as 300 gpm and wells tapping the Bangor Limestone will probably yield 300 gpm or more in places. Small to moderate yields, generally less than 20 gpm, are obtained from the Gasper Formation and Ste. Genevieve Limestone undifferentiated, Hartselle Sandstone, Pennington and Pottsville Formations, and post-Pennsylvanian rocks undifferentiated.

The ground-water consumption in Lawrence County is estimated to be 1,500,000 gpd. The estimated minimum yield of 28 springs inventoried in the county is 2,000,000 gpd. Minimum runoff from all springs is at least double the total amount of ground water being used.

Water from aquifers in Lawrence County is generally of good quality but may require treatment for some uses where it has excessive hardness. Water obtained from sandstone, sand, and gravel aquifers is generally soft to moderately hard and water from limestone, chert, and shale aquifers is generally hard to very hard. Locally, sulfurous water is reportedly obtained from wells tapping the Fort Payne Chert and the Tuscumbia and Bangor Limestones. Objectionable quantities of hydrogen sulfide, iron, and carbon dioxide are reported to occur locally in the Hartselle Sandstone. Locally, objectionable amounts of iron are reportedly obtained from wells tapping the Pottsville Formation.

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BASIC DATA

Table 4.—*Records of wells and springs in Lawrence County*

Well or spring: Numbers correspond to those in tables and plates.

Type: D, drilled; Du, dug; S, spring.

Depth of well and water level: Depths shown in feet are reported; those shown in feet and tenths are measured.

Altitude: Altitudes are taken from published topographic quadrangle maps.

Method of lift: M, manual; N, none; Pp, pitcher; Pv, rod; T, turbine; Tj, jet; Ts, submergible.

Use of water: D, domestic; Ind, industrial; N, not used; P, public supply undifferentiated; Pc, church; Pm, municipal; Ps, school; S, stock.

Water-bearing unit: Mfp, Fort Payne Chert; Mt, Tuscumbia Limestone; Mgs, Gasper Formation and Ste. Genevieve Limestone undifferentiated; Mh, Hartselle Sandstone; Mb, Bangor Limestone; Mp, Pennington Formation; IPpv, Pottsville Formation; pIP, post-Pennsylvanian undifferentiated.

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
B- 1	Bob McWhorter		D		6	pIP	665	57.5	9-22-60	Tj	D	..	11	34	
C- 1			D	89.5	6	Mfp	565	18.5	9-22-60	Tj	D	..	...	....	
C- 2			D	65.5	6	Mfp	585	36.8	9-22-60	Tj	D	..	...	....	
C- 3	W. J. Terry	J. B. Cotton	D	87	6	Mfp	572	11	.....	Tj	D	..	11	20	
C- 4	...do	...do	D	97	6	Mfp	585	21	.....	Tj	D	..	4	78	
C- 5	Bayles Fishing Camp.	Otis Terry	D	80	6	Mfp	525	.....	.....	Tj	P	..	18	184	Supplies cafe and 22 cabins. Reported to contain sulfur.
C- 6	Cole Foster Estate		D	74	6	Mfp	585	24	.....	Pv	D	63	21	210	

C- 7	William Lee		D	132.0	6	Mfp	615	59.0	9- 9-60	M	D	64	4	165	Supplies 4 houses.
C- 8	M. H. Harris		D	67.4	6	Mfp	618	63.5	9-22-60	M	D	64	18	36	Inadequate for domestic supply.
C- 9	Jimmy Blair		Du	43.0	36	pIP	620	37.9	9-22-60	M	D	..	14	32	
C-10	M. H. Harris		Du	33.1	36	pIP	565	32.1	9-22-60	M	D	..	14	26	Do.
C-11	George Wilson		D	100.0	6	Mfp	555	36.3	9- 9-60	Tj	D	63	11	128	
C-12	Stella King		D	112.3	6	Mfp	578	60.4	9- 9-60	M	D	62	11	110	
C-13	Susie Campbell		D	155.0	6	Mfp	592	71.1	9- 9-60	M	D	62	11	136	Supplies 3 houses.
C-14	A. J. Terry		D	73.5	6	Mfp	593	66.0	9- 9-60	M	D	64	4	124	
C-15	William Lee		D	79.9	6	Mfp	575	66.8	9- 9-60	M	D	63	11	142	
C-16	J. B. Cotton		D	121	6	Mfp	602	86.3	9- 8-60	Tj	D	..	4	120	
C-17	Dr. O. D. Brackin		D	200	6	Mfp	582	61.1	9-14-60	Tj	D	..	11	148	
C-18	T. A. Bowles		Du	43.4	36	pIP	565	29.6	9-14-60	N	N	..	...	....	
C-19	M. H. Harris		D	85	6	Mfp	580	60	.....	Ts	D	..	7	32	
C-20	...do		Du	28.7	36	pIP	600	24.4	9-19-60	M	D	..	14	26	Inadequate for domestic supply.
E- 1	Ray Burden		D	60	6	Mfp	550	32.4	9- 8-60	Tj	D	..	11	140	
E- 2	J. H. Lile		D	43.6	6	Mt	541	15.4	9- 8-60	Tj	D	63	11	166	
E- 3	Janie Preuit		D	35	6	Mt	555	29	.....	Tj	D	..	7	134	
E- 4	C. M. Robinson		D	.....	6	Mt	562	40.4	9- 8-60	Tj	D	63	7	190	Well No. 1 (Johnston, 1933, pt. 2, table 26). Supplies 2 houses and dairy. Drilled below 46 ft. after 1950.
E- 5	D. C. Brackin		D	70	6	Mt	561	38	.....	Pv	D	..	4	174	Supplies 3 houses.
E- 6	C. J. Young		D	150	6	Mt	559	34.7	9- 8-60	Tj	D	63	35	96	Supplies 3 houses. Reported to contain sulfur.
E- 7	Pauline Dawson		D	30	6	Mt	549	23	.....	Tj	D	..	14	222	Water is reported to have an objectionable taste.
E- 8	G. H. Brackin		D	65.1	6	Mt	573	43.7	9- 8-60	M	D	63	7	184	
F- 1	Jimmy Blair		Du	34.0	36	pIP	583	32.7	9-19-60	M	D	64	18	32	Inadequate for domestic supply.
F- 2	T. A. Bowles, Jr		D	67.3	6	Mfp	539	15.9	9-19-60	M	D	64	7	62	
F- 3	Garner Estate		D	82	6	Mfp	570	47.9	9-14-60	Tj	D	..	2	84	
F- 4	Matilda Garner		D	61.1	6	Mfp	552	39.0	9- 8-60	M	D	63	18	176	Supplies 3 houses.
F- 5	J. B. Cotton		D	107	6	Mfp	559	60	.....	Tj	D	..	4	140	Do.
F- 6	Preuit Estate		D	56.7	6	Mt	570	54.1	9-14-60	M	D	62	4	198	Develops water at top of bedrock.
F- 7	Willy and Susy Fitzgerald.		D	47.6	6	Mfp	535	28.6	9-14-60	M	D	63	11	202	
F- 8	Irving Norwood		D	130.9	6	Mfp	559	45.1	9- 8-60	M	D	63	7	136	

Table 4.–*Records of wells and springs in Lawrence County*–Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
F- 9	Ed Mauldin		D	55.8	6	Mt	550	40.8	9-14-60	M	D	63	14	194	
F-10	Jean Brackin		D	70	6	Mt	575	50.1	9-14-60	Pv	D	..	18	178	
F-11	R. N. Harris, Jr		D	65	6	Mfp	561	40	.....	Tj	DS	..	7	160	
F-12	... do		D	49.5	6	Mfp	557	47.5	9-19-60	N	N	..	...	.....	Inadequate for domestic supply.
F-13	Jimmy Blair		S	.....	...	Mt	538	.....	.....	..	N	65	7	216	Estimated flow 50 gpm on 9-19-60.
F-14	R. E. Simpson		D	80	6	Mt	575	65	.....	Ts	D	..	7	112	
F-15	Winnie Reed		D	82.7	6	Mt	558	57.6	9-19-60	M	D	65	11	204	
F-16	Ed Mauldin		D	79.8	6	Mt	558	41.0	9-14-60	M	D	63	21	222	
F-17	Ed Fennel		D	200	6	Mt	552	18.5	9-14-60	M	D	62	14	298	Reported to contain sulfur.
F-18	Mrs. J. B. Spangler		D	97	6	Mt	569	52.5	9-14-60	Pp	N	..	...	.....	
F-19	Ed Mauldin		Du	45	36	pIP	581	29	.....	Tj	D	..	11	222	Supplies 5 houses.
F-20	City of Town Creek	H. W. Peerson Drilling Supply Co.	D	180	8	Mt-Mfp	563	.....	.....	T	Pm	62	11	216	Reported slight drawdown after 24 hrs. pumping 150 gpm in summer of 1937. Municipal supply for about 800 people. Average pumpage 50,000 gpd. See chemical analysis in table 3.

F-21	Ed Mauldin	W. L. Hawk	D	71.7	6	Mt	563	44.6	9-29-60	N	N	64	11	208	Casing: 6-in. to 45 ft. Develops water from 70 to 80 ft. Reported to pump 50 gpm. Supplied steam gin in 1904; municipal supply prior to 1957 when Ala. State Dept. of Public Health condemned well. Reported to contain sulfur.
F-22	Cliff Taliaferro		D	102.3	6	Mt	565	49.3	9- 6-60	N	N	..	...	.....	
F-23	Mr. Hanson		D	44.8	6	Mt	567	18.3	9- 8-60	N	N	..	...	.....	
F-24	Ed Mauldin		Du	40	36	pIP	580	32	.....	Tj	D	..	11	244	Supplies 3 houses.
F-25			D	84.9	6	Mt	610	65.7	9-19-60	M	D	65	11	242	
F-26	D. L. Martin		D	33.1	6	Mt	590	20.2	9-23-60	M	D	..	11	248	
F-27	Porter Hitt		D	29.0	6	Mt	569	25.8	9-23-60	M	D	..	11	204	
F-28	City of Courtland	Miller Drilling Co.	D	76.0	6	Mt	579	35.2	9-28-60	Ts	Pm	..	11	216	Casing: 6-in. to 22 ft.; develops water from 56 to 60 ft.; bail tested at 30 gpm. Supplies 16 apartment units at Courtland Downs. See driller's log in table 5.
F-29	H. D. Bynum		S	.....	...	pIP	558	.....	.....	..	N	64	11	130	Known as Bynum Spring. Nonflowing on 9-23-60.
F-30	Rocky Hill Elementary School.		D	101.2	6	Mt	583	24.1	9-23-60	M	Ps	64	11	222	Supplies 78 students. Water contains an iron precipitate.
F-31	State of Alabama	Hurst Machine Works.	D	240	12	Mfp	582	50	.....	Tj	S	..	14	264	Casing: 12-in. to 55 ft. Supplied Courtland Basic Flying School from 1942 to 1946. Reported yield, 200 gpm. Now supplies 1,500 cattle. See driller's log in table 5.
F-32	... do		D	200	12	Mfp	582	48.7	9-15-60	N	N	..	...	.....	Listed as Law-2 in Federal observation well network, Alabama district. Casing: 12-in. to 55 ft. Supplied Courtland Basic Flying School from 1942 to 1946.
F-33	G. D. Bynum		D	75	6	Mt	622	64.5	9-23-60	Pv	D	..	11	326	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
F-34	Mrs. Edgar Odell		D	160	6	Mfp	586	100		Tj	D		11	296	Supplies 3 houses. Inadequate supply in summer of 1960.
F-35	Clyde Goode		D	53.1	6	Mt	577	35.7	9-22-60	M	D	63	11	280	
F-36	E. V. Blyth		D	145	6	Mt	566	36		Tj	D		4	274	
F-37	Mrs. Jackson		D	74.3	6	Mt	590	49.8	9- 7-60	M	D	63	11	286	Observation well.
F-38	Junior Campbell		D	52.8	6	Mt	581	16.4	9-22-60	M	D	63	60	308	
F-39	H. J. Brackin		D	131	6	Mt	622	42		Tj	D		60	294	Develops water at 109 ft. Drawdown 3 ft. after bailing 20 gpm.
F-40	J. C. Sugg		D	58.3	6	Mt	620	33.4	9-23-60	M	D	63	18	366	
F-41	Arnold Hughes		D	65	6	Mt	588	48		Tj	D		11	284	
F-42	Frank Gilman		D	128.1	6	Mt	564	20.3	9-23-60	M	D	63	50	292	
G- 1	Joe Wheeler Estate		Du	37.1	36	plP	624	28.8	9-29-60	M	D	64	11	134	
G- 2	Mrs. Malcolm Lane	Adams-Massey Drilling Co.	D	283		Mfp	649								Abandoned dry test well. Casing pulled. See driller's log in table 5.
G- 3	R. J. Blankenship		D		6	Mfp	560			Tj	P		11	136	Casing: 6-in. to 90 ft. Supplies cafe, store, and 8 cabins at Spring Creek Fish Camp.
G- 4	Mrs. R. H. Tweedy, Sr.		D	55.6	6	Mfp	571	19.4	9-28-60	M	D	64	11	138	
G- 5	Eva Fowler		D	38.5	6	plP	580	28.2	9-29-60	M	D	64	11	20	

G- 6	Jimmy Blair		S			Mt	540				N	62	11	136	Known as McDonald Spring. Well No. 40 (Johnston, 1933, pt. 2, table 27). Estimated flow 50 gpm on 9-19-60.
G- 7	... do		D	64.1	6	Mt	582	42.6	9-28-60	M	D		11	144	Reported to contain sulfur.
G- 8	Dr. H. W. Prichett		D	62.6	6	Mt	589	59.5	9-29-60	M	D	64	11	128	
G- 9	Mrs. W. A. Toms		D	47.9	6	Mt	572	23.8	9-28-60	M	D	64	11	144	
G-10	V. G. Moore		D	81.6	6	Mt	588	38.7	9-29-60	M	D	64	11	148	
G-11	Joe Wheeler Estate		D	184.4	6	Mfp	609	80.9	9-29-60	M	D	63	11	96	
G-12	... do		D	30.0	6	Mt	587	24.4	9-29-60	M	D	64	11	102	
G-13	... do		Du	31.4	36	plP	589	28.1	9-29-60	M	D	65	11	84	
G-14	... do		D	52.5	6	Mt	592	40.5	9-29-60	M	D	64	11	92	
G-15	Miss Lavinia Chardavoyne.		D	61.7	6	Mt	581	46.2	9-28-60	M	D	64	11	184	
G-16	W. G. Houston		D	164.6	6	Mfp	585	47.2	9-28-60	M	D		11	92	
G-17	Lynn Cross		D	71	6	Mt	572	20		Tj	D		11	208	
G-18	Katie Sykes		D	43.6	6	Mt	575	27.7	9-30-60	M	D	64	11	304	Water contains an iron precipitate.
G-19	Joe Wheeler Estate		D	33.4	6	Mt	572	18.1	9-30-60	M	D		11	184	
G-20	J. L. Green		D	140	6	Mt	565	45		Ts	D		11	172	
G-21	E. S. Ballentine, Sr.		S			Mt	550				N	62			Known as Swopes Pond and Swoope Lake. Well No. 41 (Johnston, 1933, pt. 2, table 26). Rock fissure at southeast corner of lake is now covered by Wheeler Reservoir. Estimated flow 200 gpm on 9-30-60.
G-22	Joe Wheeler Estate		D	46.5	6	Mt	585	31.2	9-29-60	M	D	64	11	124	
G-23	Claude Dyar		D	54.3	6	Mt	611	50.9	10- 4-60	M	D	64	7	122	
G-24	Coleman Terry		D	44.7	6	Mt	580	22.7	9-30-60	Tj	D		11	196	
G-25	Daniel Gilchrist, Jr.		D	31.3	6	Mt	581	23.9	10- 4-60	M	D		39	136	Inadequate for domestic supply.
G-26	Fred Redmond		D	75	6	Mt	592			Tj	D, S		18	150	
G-27	D. L. Martin, Jr		D	181.5	6	Mfp	566	31.7	9-30-60	M	D	63	11	184	
G-28	P. L. Swope		D	39.6	6	plP	565	27.6	9- 7-60	M	D	63	11	192	Observation well.
G-29	C. L. Terry	W. H. Copeland	D	201	6	Mfp	569	25.0	3-16-61	Ts	P		14	200	Bedrock at 35 ft. Reported to hit cave at 201 ft. Supplies cafe, store, and 6 cabins.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
G-30	City of Courtland...	Adams-Massey Drilling Co.	D	238	8	Mfp	574	30.0	12- 3-53	N	N	..	...	.....	Municipal supply from 1953 to 1959. Reported 70 ft. drawdown after 24 hrs. pumping 202 gpm on 11-30-53. Well was filled in 1959. Water is reported to have slight sulfurous odor. See driller's log in table 5.
G-31	... do	Miller Drilling Co.	D	226	8	Mfp	574	135.0	9-28-60	T	Pm	63	14	181	Casing: 8-in. to 30 ft. Reported 90 ft. drawdown after pumping 200 gpm on 7-17-59. Water level measured with airline. Estimated daily pumpage 50,000 gpd. See driller's log in table 5.
G-32	... do	H. W. Peerson Drilling Supply Co.	D	165	8	Mfp	564	27	.....	T	Pm	62	...	.....	Well No. 4 (Johnston, 1933, pt. 2, table 26). Reported to pump 100 gpm. Estimated average daily pumpage 30,000 gpd. See chemical analysis in table 3.

G-33	Lelia S. Martin		D	150	6	Mt	576	.....	.....	Ts	D,S	..	25	190	
G-34	Miss Mary Hotchkiss		D	66.7	6	Mt	596	37.3	9-30-60	M	D	..	11	248	
G-35	Daniel Gilchrist, Jr.		D	40.8	6	Mt	596	3.1	9-30-60	N	N	..	...	.....	
G-36	Joe Wheeler Elementary School.		D	.....	6	Mt	586	16.5	9-28-60	Tj	Ps	..	11	206	Supplies 34 students.
G-37	Wheeler Elementary School.		D	.....	6	Mt	598	25	.....	Tj	Ps	..	4	162	Supplies 83 students.
G-38	Daniel Gilchrist, Jr.		D	30.6	6	Mt	592	7.2	9-30-60	M	D	..	18	220	
G-39	Southern Railway		S	.....	...	Mt	595	.....	.....	..	N	62	11	154	Known as Wheeler Spring. Spring No. 42 (Johnston, 1933, pt. 2, table 27). Supplied steam engine boilers when used by railway. Estimated flow 400 gpm on 9-28-60.
G-40	Daniel Gilchrist, Jr.		D	41.0	6	Mt	592	26.4	10- 4-60	M	D	64	7	164	
G-41	Woodrow Hamilton		D	60.0	6	Mt	595	46.3	10- 4-60	M	D	64	4	202	
H- 1	E. M. Farrior	A. G. Hare	D	307	6	Mfp	622	.....	.....	Ts	D	63	188	172	See driller's log in table 5.
H- 2	... do	... do	D	230	6	Mfp	595	50.7	10- 4-60	Ts	D	..	25	70	
H- 3	Joe Wheeler Estate		Du	31.6	36	plP	610	18.9	10- 4-60	M	D	..	25	40	
H- 4	Daniel Gilchrist, Jr.		Du	28.7	36	plP	600	24.1	10- 4-60	M	D	64	11	28	
H- 5	A. H. Turner		Du	28.6	36	plP	610	24.8	10- 4-60	M	D	..	25	36	Inadequate for domestic supply.
H- 6	R. L. Foster		Du	22.9	36	plP	600	19.2	10- 7-60	M	D	..	18	60	Do.
H- 7	Hattie Davis		Du	27.7	36	plP	579	25.1	10- 7-60	M	D	..	18	50	
H- 8	Elizabeth Chandler		S	.....	...	Mt	558	.....	.....	..	N	..	...	.....	Known as Blue Spring. Wheeler Reservoir covers spring flow.
H- 9	... do		Du	28.0	36	plP	598	20.4	10- 7-60	M	D	64	25	212	
H-10	Robert Locklayer		Du	27.7	36	plP	581	18.5	10-11-60	Tj	D	..	7	20	
H-11	Mrs. J. L. Bibb		D	80.4	5	Mt	622	65.2	10- 7-60	M	D	..	25	172	
H-12	Bynum Estate		D	46.8	6	Mt	581	28.5	10- 7-60	M	D	64	39	166	
H-13	William Watkins		D	19.8	6	Mt	570	14.6	10- 7-60	Tj	D	..	46	206	
H-14	Matilda Foster		D	42.9	6	Mt	579	25.3	10- 7-60	M	D	..	25	166	
H-15	Fred Redmond		D	175.1	6	Mfp	589	29.5	10- 7-60	M	D	62	11	102	
H-16	Darmer McBride, Sr.		D	94.9	6	Mt	596	35.2	9- 7-60	M	D	63	18	198	Observation well.
H-17	Frank Shackeford		D	70.3	6	Mt	596	31.0	10- 7-60	M	D	..	18	204	
H-18	Ola Birgan		D	59.2	5	Mt	585	25.8	10-11-60	M	D	64	21	244	
H-19	Lawrence Davis		D	38.0	6	Mt	585	24.7	10-11-60	M	D	..	18	154	
H-20	Robert Locklayer		Du	43.0	36	plP	610	38.5	10-11-60	M	D	..	11	86	Inadequate for domestic supply.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
I- 1	P. Lacy		D	42.0	6	pIP	584	28.9	10-11-60	M	D	63	11	30	
I- 2	John Joseph		D	34.0	6	pIP	585	15.7	10-12-60	M	D	..	11	72	
I- 3	C. C. Collins		D	53	6	Mt	583	13.2	10-12-60	Tj	P,D	..	11	150	Bedrock at 21 ft. Supplies 2 houses, cafe, and service station.
I- 4	State of Alabama		S			pIP	585				N	64	11	90	Estimated flow 5 gpm on 10-11-60.
I- 5			D	69.8	6	Mt	585	8.4	10-12-60	M	D	..	11	162	
I- 6	Cary Miller		D	29.9	6	Mt	596	20.6	10-12-60	M	D	..	110	300	
I- 7	J. D. Walker		D	54.0	6	Mt	592	36.7	10-11-60	M	D	63	11	96	
I- 8	Hillsboro Elementary School.		D	72	6	Mt	606	50		Tj	Ps	..	11	172	Supplies 101 students.
I- 9	Garnett Ennis		D	89	6	Mt	605	50		Tj	D	63	11	228	Well No. 12 (Johnston, 1933, pt. 2, table 26).
I-10	Tennessee Valley High School.		D	50	6	Mt	610	22.6	10-11-60	Tj	Ps	..	11	188	Supplies 343 students.
I-11	Raymond Council		D	32.8	6	Mt	596	12.4	10-12-60	M	D	..	53	176	
I-12	J. G. Finley		Du	37.6	36	pIP	602	26.6	10-12-60	Tj	D	64	46	192	Supplies 7 houses.
I-13	S. P. Lile		Du	27.2	24	pIP	607	21.8	10-11-60	M	D	..	32	142	Inadequate for domestic supply.
I-14	W. E. Pitt		D	72.2	6	Mgs	632	9.2	10-12-60	Tj	D	..	7	206	
I-15	Theodis Scruggs		D	31.6	6	pIP	643	10.7	10-12-60	M	D	..	35	92	
I-16	E. A. Hannay		D	54.3	6	Mt	615	8.4	10-12-60	M	D	63	4	180	

I-17	Darmer McBride, Sr.	.....	D	35.8	6	Mt	626	10.8	10-12-60	M	D	..	11	238	
I-18	R. B. Harris	.....	D	35.0	6	Mgs	645	4.3	10-12-60	M	D	63	11	298	
I-19	Fred Redmond	.....	D	38.6	6	Mgs	652	28.8	10-13-60	M	D	..	124	108	
I-20	W. W. Hutto	.....	D	88.6	6	Mgs	705	11.3	10-12-60	M	D	63	32	582	
I-21	A. C. Lance	.....	D	76.9	6	Mt	622	10.9	10-13-60	M	D	63	25	342	
I-22	Frank Lamon	.....	D	30	6	Mt	622	16	.....	Tj	D	..	25	120	
I-23	A. L. Roberts	.....	D	100	6	Mt	642	20	.....	Tj	D	..	11	328	
I-24	W. C. Alexander ...	.....	Du	20.7	40	plP	810	2.6	10-18-60	Tj	D	..	11	16	
I-25	Buddy Roberson ...	.....	Du	27.5	6	plP	685	9.1	10-13-60	M	D	64	39	176	Dug 36 inches in diameter, then installed 6-in. casing and filled around outside.
I-26	J. R. Pitt	.....	D	54	6	Mh	822	36.8	10-13-60	Tj	D	..	7	40	Inadequate for domestic supply.
I-27	H. D. Wilhoit	.....	D	30.8	6	Mh	810	21.9	10-13-60	M	D	63	11	24	
I-28	G. W. Eady	.....	D	68.0	6	Mgs	720	49.6	10-18-60	Tj	D	..	131	292	
I-29	Orrville Terry	.....	S	.....	...	Mh	765	....	.....	..	N	63	11	86	Known as Sulphur Spring. Estimated flow 20 gpm on 10-13-60.
I-30	Claude Turner	.....	D	46.5	6	Mh	783	13.4	10-18-60	M	D	..	18	18	
I-31	E. C. Bowling	S. T. Little	D	206	6	Mh-Mgs	795	51.4	10-18-60	Ts	D	63	4	144	Small cavity at 65 ft. See driller's log in table 5.
I-32	Dan Aday	.....	D	41.5	6	Mh	778	15.3	10-18-60	M	N	..	...	.....	
I-33	J. R. Runager	.....	D	131.6	6	Mh-Mgs	810	44.5	10-13-60	M	D	63	14	150	
I-34	H. L. Montgomery ..	.....	D	60	6	Mh	790	8	.....	Tj	D	..	7	110	
I-35	Willard Hawk	.....	D	82.6	6	Mgs	772	42.1	10-13-60	Tj	D	..	7	162	
J- 1	Joe Wheeler Estate.	.....	D	38.8	6	Mt	606	25.6	10-18-60	M	D	..	18	238	
J- 2	... do	.....	D	28.5	6	Mt	616	9.5	10-18-60	M	D	..	11	240	Supplies 5 houses.
J- 3	... do	.....	D	39.6	6	Mt	625	33.1	10-18-60	M	D	..	18	240	Quality of water reported to be poor.
J- 4	Grady Orr	.....	D	45.0	6	Mt	582	25.8	10-19-60	M	D	..	11	246	
J- 5	Roland Cross	.....	D	50.0	6	Mt	587	27.5	10-18-60	M	D	..	11	322	
J- 6	Leroy Owens	.....	Du, D	62.6	36, 6	Mgs	657	48.8	10-21-60	Tj	D	62	18	412	Dug 36-in. to 56 ft., then drilled 6-in. to 63 ft.
J- 7	J. P. Letson	.....	S	.....	...	Mh	780	....	.....	..	N	60	4	76	Known as Spout Spring. Spring No. 43 (Johnston, 1933, pt. 2, table 26). Estimated flow 10 gpm on 10-21-60.
J- 8	Joe Wheeler Estate.	.....	D	61.3	6	Mgs	680	45.8	10-18-60	M	D	65	25	764	Reported to contain sulfur.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
J- 9	Joe Wheeler Estate		D	28.7	6	Mgs-Mt	653	18.7	10-18-60	M	D	..	39	230	
J-10	Darmer McBride, Sr.		D	79.2	6	Mt	647	36.3	10-19-60	M	D	...	11	320	
J-11			D	31.1	6	Mgs	647	29.1	10-19-60	N	N	..	...	.....	
J-12	Melvin Hutto		D	57	6	Mh	861	37	.....	Tj	D	63	53	14	Well No. 9 (Johnston, 1933, pt. 2, table 26).
J-13	J. P. Letson		D	79.1	5	Mh	810	76.5	10-21-60	M	D	..	4	60	
J-14	Mrs. Gurney Wilson		S	.....	...	pIP	630	....	.....	..	N	60	7	78	Estimated flow 5 gpm on 10-21-60.
J-15	D. L. Martin, Jr.		S	.....	...	pIP	680	....	.....	..	N	63	11	88	Known as Sulphur Spring. Spring No. 44 (Johnston, 1933, pt. 2, table 27). Estimated flow 20 gpm on 10-24-60.
J-16	Jimmy Landers		D	79.8	6	Mgs	628	25.8	10-24-60	N	N	..	...	.....	
J-17			D	37.5	6	Mh	782	19.2	10-21-60	N	N	..	...	.....	Well No. 10 (Johnston, 1933, pt. 2, table 26).
J-18	Robert Ray		D	39.6	6	Mh	822	26.6	10-21-60	M	D	..	4	12	
J-19	P. W. Letson		D	44.0	6	Mh	810	39.3	10-21-60	N	N	..	7	20	
J-20	... do		D	38	6	Mh	795	17	.....	Tj	D	..	39	42	
J-21	State of Alabama		S	.....	...	Mh	770	....	.....	..	N	62	11	14	Known as Bluff Spring. Estimated flow 10 gpm on 10-21-60.
J-22	J. E. Stewart		D	52.4	6	Mgs	657	13.7	10-21-60	M	D	..	46	490	

J-23	R. H. Hale	Johnnie Harris	D	66.7	6	Mh	800	20.0	10-24-60	Tj	D	..	4	22	Casing: 6-in. to 15 ft. See driller's log in table 5.
J-24	R. L. Wade		D	63.1	6	Mh	785	41.1	10-24-60	M	D	63	11	16	
J-25	Claude Dyar		D	47.0	6	Mh	775	26.6	10-24-60	M	D	..	67	24	
J-26	T. T. Terry		D	34.8	6	Mh	790	23.5	10-24-60	Tj	D	..	43	20	
J-27			S			Mh	648				N	58	7	84	Known as Sinking Creek Spring. Estimated flow 100 gpm on 10-24-60.
J-28	G. D. Letson		D	34.1	6	Mh	792	12.2	10-25-60	M	D	..	11	16	
J-29	Miss Ethel Cross		D	41.1	6	Mh	780	27.1	10-24-60	M	D	..	11	36	
J-30	Roy Nelson		D	102.0	6	Mh	742	33.4	10-24-60	Tj	D	..	11	18	
J-31	G. D. Letson		D	91.3	6	Mh	708	28.3	10-24-60	M	D	63	39	16	
J-32	Malcolm Hazle		D	205	6	Mgs	730	66.3	10-25-60	Tj	D	..	11	316	
J-33	Odean Kelley		D	54.8	6	Mh	763	48.3	10-25-60	N	N	..	...	.....	
J-34	Roy Grimm		D	46.4	6	Mh	738	32.2	10-24-60	M	D	63	18	18	
J-35	Chalybeate Junior High School.	A. G. Hare	D	100	6	Mh	775	35		Tj	Ps	..	11	24	Supplies 310 students. See driller's log in table 5.
J-36	C. E. Buttran	Johnnie Harris	D	65	6	Mh	790	50		Tj	P	..	11	16	Develops water at 50 ft. Reported bail tested at 10 gpm. Supplies cafe, store, and 1 house.
K- 1	Daniel Gilchrist, Jr.		D	36.6	6	Mt	570	24.9	10-25-60	M	D	..	4	260	
K- 2	W. H. Witt	Johnnie Harris	D	99	6	Mt	592	60		Tj	D	..	11	272	Bedrock at 18 ft. See driller's log in table 5.
K- 3	Cecil Norton		D	69.0	6	Mt	583	40.4	10-25-60	M	D	63	25	252	
K- 4	George Bain		D	52.2	6	Mgs	608	2.8	10-26-60	M	D	..	273	2,480	
K- 5	Luther Kay		S			Mgs	680				N	61	4	114	Known as Brooks Spring. Estimated flow 5 gpm on 10-25-60.
K- 6	Ellick Irving		D	44.5	6	Mh	835	26.7	10-26-60	N	N	..	...	.....	
K- 7	D. H. Tolbert		D	113.6	6	Mgs	595	15.0	10-26-60	M	D	..	252	1,330	
K- 8	Robert Berryman		D	99.0	6	Mh	772	82.0	10-26-60	M	D	63	4	16	
K- 9	Dewey Lovelady		D	82.7	6	Mh	811	50.1	10-26-60	M	D	63	11	104	
K-10	Rupert Terry		Du	16.3	18	plP	601	2.2	10-26-60	M	D	..	11	96	Inadequate for domestic supply.
K-11	Robert Livingston		D	57	6	Mt	575	37		Tj	D	..	32	434	
K-12	Lilbern Terry		D	61.9	6	Mgs	592	10.4	11- 1-60	Tj	D	..	18	148	
K-13	Daniel Gilchrist, Jr.		D	61.7	6	Mt	601	29.3	10-25-60	M	D	63	11	380	
K-14	Ed Martin		D	27.8	6	Mgs	580	10.7	10-28-60	M	D	..	74	172	
K-15	Roy Lee Terry		D	64	6	Mgs	593	34		Tj	D	..	32	240	
K-16	Coy Walter		D	55	6	Mgs	592			Tj	D	..	89	598	

Table 4.–*Records of wells and springs in Lawrence County*–Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
K-17	M. O. Connors	Reynolds Metals Co.	D	300	13, 10	Mh	780	64.0	10-26-60	N	N	65	11	40	Oil test No. 1G130 (Toulmin, 1945, p. 92-94; and McGlamery, 1955, p. 217-246). Casing: 13-in. to 20.7 ft.; 10-in. to 312 ft.; 6 5/8-in. to 3,054 ft. Cemented below 300 ft.
K-18	Elmer Patterson		D	75.6	6	Mgs	740	31.7	10-26-60	Tj	D	..	11	190	
K-19	Leon Beck		D	83.2	8	Mh	708	58.3	11- 1-60	M	D	62	32	128	
K-20	W. B. Vines		D	39.2	6	Mh	720	24.5	10-26-60	M	D	..	18	32	
K-21	Coburn Terry		D	47.0	6	Mh	752	17.6	11- 1-60	M	D	63	18	36	
K-22	Ed Terry, Jr.	Otis Terry	D	100	6	Mh	744	70	.....	Tj	D	..	11	88	
K-23	Lelton Martin		S	.....	...	Mh	635	.....	.....	..	N	60	4	106	Known as Horton Spring. Estimated flow 10 gpm on 10-28-60.
K-24	Bernard King		D	76.8	6	Mh	732	42.1	11- 1-60	M	D	63	67	68	
K-25	Layton Wilson		D	43.8	6	Mh	692	13.7	11- 1-60	Tj	D	..	4	154	
K-26	Mrs. Ellie Jackson		D	32.5	6	Mh	692	17.9	11- 1-60	M	D	..	89	28	
K-27	Malvina Mardies		D	23.5	6	Mh	692	18.5	11- 1-60	M	D	..	18	34	
K-28	Luther Norton	Johnnie Harris	D	110	6	Mh	682	.....	.....	Tj	D	..	11	100	See driller's log in table 5.
K-29	Little Estate		D	75	6	Mgs	682	40.8	11- 2-60	Tj	D	..	18	212	Estimated to pump 20 gph.

K-30	.....	.....	D	50.9	6	Mh	700	19.1	11- 2-60	M	D	63	11	32	
K-31	Price Sherrill.....	.....	D	38.7	6	Mh	692	27.5	11- 2-60	M	D	..	11	26	
K-32	New Liberty Church.	.....	D	28.6	6	Mh	742	16.6	11- 1-60	M	Pc	..	11	10	
K-33	C. O. Terry.....	.....	D	69.4	6	Mh	712	49.4	11- 1-60	M	D	63	11	6	
K-34	Bueford Pearson ...	.....	D	25.0	6	Mh	752	10.9	10-28-60	M	D	..	11	16	
L- 1	.....	.....	D	93.0	6	Mgs	583	26.3	11- 3-60	N	N	..	53	188	
L- 2	D. L. Berryman	.....	D	59	6	Mh	734	35	.....	Tj	D	..	11	18	
L- 3	.....	.....	D	150.0	6	Mgs	550	46.2	11- 3-60	Tj	D	..	53	90	
L- 4	Neal Cox.....	.....	D	55.4	6	Mh	722	22.9	11- 3-60	Tj	D	..	11	32	
L- 5	Mrs. J. R. Berryman	.....	D	120.7	6	Mgs	725	64.9	11- 3-60	N	N	..	...	.....	
L- 6	J. T. Parker	.....	D	47.3	6	Mh	760	30.0	11- 3-60	M	D	..	60	46	
L- 7	C. M. Briley.....	.....	D	70.6	6	Mh	743	38.9	11- 3-60	Tj	D	..	18	58	
L- 8	Dewey Parker	.....	D	23.3	6	Mh	727	21.7	11- 3-60	M	N	..	18	22	
L- 9	John Jeffreys.....	.....	D	38.5	6	Mh	690	27.0	11- 3-60	M	D	63	18	80	
L-10	Hollis Lowery	.....	D	107.6	6	Mgs	570	16.5	11- 4-60	N	N	..	25	178	
L-11	A. J. Colburn	Johnnie Harris...	D	62.1	6	Mh	698	11.6	11- 4-60	M	D	..	4	14	See driller's log in table 5.
L-12	C. B. Willis	.....	D	42.5	6	Mh	740	18.2	11- 3-60	M	D	..	32	34	
L-13	Ted and Gabe Poole	.....	S	.....	...	Mh	670	.....	.....	..	N	..	18	62	Known as Wolf's Springs (Semmes, 1929, p. 126). Estimated flow 5 gpm on 11-3-60.
L-14	Vester Simmons	.....	D	92.5	6	Mh	750	31.3	11- 4-60	M	D	62	11	18	
L-15	George Nesmith....	.....	D	24.4	6	Mh	696	14.4	11- 4-60	M	D	..	11	24	
L-16	William Saint	.....	D	31.5	6	Mh	705	20.9	11- 4-60	M	D	..	11	22	
L-17	Wolf Springs Elementary School.	.....	D	47.3	6	Mh	703	28.5	11- 3-60	Tj	Ps	..	4	20	Supplies 62 students.
L-18	Oscar Nichols	.....	D	68.0	6	Mh	650	10.5	11- 4-60	M	D	63	4	24	
L-19	Roy Cole.....	.....	D	46.6	6	Mh	672	34.2	11- 4-60	M	D	63	11	28	
L-20	T. B. Masterson ...	.....	D	76.9	6	Mh	633	48.2	11- 4-60	M	D	63	89	96	
L-21	Lowaine Harrison ..	.....	D	33.5	6	Mh	605	6.3	11- 4-60	M	D	..	39	112	
L-22	Dr. W. R. Taylor ...	.....	D	54.7	6	Mh	656	24.1	11- 4-60	M	D	63	11	88	
L-23	Clarence Jeffreys ..	.....	D	60	6	Mh	652	40	.....	Tj	D	..	39	56	
L-24	Sanderson Chapel Methodist Church.	.....	D	56.9	6	Mgs	663	15.8	11- 4-60	Tj	Pc	..	32	350	
M- 1	W. C. Nesmith	.....	D	52.3	6	Mh	632	4.4	11- 7-60	M	D	63	4	116	
M- 2	Clyde Anderton	.....	D	68.9	6	Mb	638	24.5	11- 7-60	N	N	..	53	322	Reported to contain sulfur.
M- 3	W. O. Masterson ...	.....	D	56	6	Mh	595	16	.....	Tj	D	..	4	100	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
M- 4	R. B. Little		D	38.5	6	Mh	585	10.2	11- 7-60	N	N	..	...	.....	
M- 5	Alton Bradford		D	60.3	6	Mgs	589	39.7	11- 7-60	Tj	D	..	25	322	
M- 6	C. C. Smith Elementary School	Johnnie Harris	D	114	6	Mgs	589	15.6	11- 7-60	Tj	Ps	..	18	238	Supplies 76 students.
M- 7	W. R. Portwood		D	42.1	6	pIP	582	1.6	11-17-60	M	D	63	103	348	
M- 8	J. L. Craig		D	34.1	6	Mh	605	11.5	11- 7-60	M	D	..	53	58	
M- 9	W. R. Taylor		D	36.2	6	Mb	621	9.5	11-11-60	M	D	..	74	418	
M-10	E. E. Borden		D	29.2	6	Mb	642	13.1	11- 7-60	M	D	..	32	198	
M-11	W. R. Taylor		D	90	6	Mh	645	.....	.....	Tj	D	..	18	96	
M-12	Mrs. L. E. Hurst		D	111.1	6	Mh	632	40.8	11-11-60	M	D	62	53	68	Reported to contain excessive iron.
M-13	J. M. Downey		D	51.3	6	Mb	627	8.0	11-11-60	M	D	63	46	208	
M-14	G. N. Craig		D	85.6	6	Mh	635	44.4	11-11-60	M	D	63	46	132	
M-15	Paul Sutton		D	72.1	6	Mb	617	24.7	11-11-60	Tj	D	..	124	1,060	Reported to contain sulfur.
M-16	W. A. Kirby		D	35.3	6	Mh	585	6.0	11-17-60	Tj	D	..	11	92	
M-17	F. R. Hicks		D	49.6	6	Mh	593	15.5	11-17-60	M	D	64	32	48	
M-18	Will Smith		D	97.6	6	Mh	603	28.2	11- 7-60	M	D	62	103	178	
M-19	N. J. Portwood		D	30.5	6	Mb	616	12.7	11- 7-60	M	D	63	67	456	
M-20	P. H. Leigh		D	38.9	6	Mh	598	18.3	11-17-60	M	D	..	32	128	
M-21	Frank Cagle		D	48.8	6	Mh	590	31.9	11-17-60	M	D	63	25	132	
M-22	Tommy Bruton		D	120	6	Mh	602	17.7	11-11-60	Tj	D	..	18	16	
M-23	James Heathcraft		D	39.7	6	Mh	632	8.9	11-11-60	M	D	63	96	108	

M-24	-- Horton	Lawrence County Oil & Development Co.	D	1,446	6	Mh	645	.....	.....	N	N	..	...	.....	Oil test well (Semmes, 1929, p. 134; Bowles, 1941, p. 29-30). Penetrated water-bearing zone from 103 to 134 ft. Casing pulled.
M-25	J. R. Wallace	.....	D	30.2	6	Mb	641	13.4	11-11-60	M	D	63	103	454	
M-26	Arthur Borden	.....	D	52.4	6	Mb	660	29.6	11-18-60	M	D	63	25	364	
M-27	Chester Borden	.....	D	24.9	6	Mb	630	12.5	11-18-60	Tj	D	..	53	318	
M-28	Masterson Estate	.....	D	41.4	6	Mb	592	15.2	11-18-60	Tj	D	..	18	312	
M-29	Ray Massey	.....	D	85	6	Mb	603	35	.....	Tj	D	..	11	382	
M-30	Julie Blackwell	.....	D	49.7	6	Mb	602	11.3	11-17-60	M	D	63	11	272	
M-31	Sam Karrh	.....	D	190	6	Mh	619	39.1	11-17-60	Tj	D	..	89	22	Reported high carbon dioxide in water.
M-32	R. L. Camp	.....	D	84.0	6	Mb	618	4.3	11-17-60	N	N	..	...	.....	
M-33	Morris Smith	.....	D	69.6	6	pIP	650	53.0	11-17-60	M	D	63	67	76	
M-34	Willy Gadson	.....	D	38.1	6	Mb	620	24.7	11-18-60	M	D	63	103	1,280	
M-35	Ernest Murphee	.....	D	58.4	6	pIP	640	26.1	11-18-60	M	D	63	18	16	
M-36	Lennie Stevenson	.....	D	47.3	6	Mb	650	13.4	11-18-60	M	D	..	25	162	
N- 1	W. A. Elkins	A. G. Hare	D	100	6	Mgs	685	49.6	11-21-60	Ts	D	..	18	266	
N- 2	Wilburn Terry	-- Campbell	D	200	6	Mgs	682	77.1	11-21-60	M	D	62	39	174	
N- 3	Wesley Davis	.....	Du	22.8	36	pIP	702	10.7	11-21-60	N	N	..	...	.....	
N- 4	Garner Terry	.....	D	99.6	6	Mh	680	30.6	11-21-60	M	D	63	11	74	
N- 5	N. P. Campfield	.....	D	48.3	6	Mh	680	9.9	9- 6-60	M	D	63	18	62	Observation well (see fig. 5).
N- 6	Hatton Elementary School.	A. G. Hare	D	370	6	Mh	705	27	11-16-54	Tj	Ps	..	...	.....	Three old wells at school will produce a total of 1½ to 3 gpm. Supplies 292 students. See driller's log in table 5.
N- 7	Hatton High School	... do	D	269	6	Mh	700	45	3- -55	Tj	Ps	..	152	42	Two old wells at school will produce a total of ½ gpm. Supplies 283 students. Penetrated water-bearing zone from 100 to 103 ft. Bail tested at 30 gpm with less than 5 ft. of drawdown. See driller's log in table 5.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
N- 8	Cecil Smith		D	85.7	6	Mh	622	24.7	11-18-60	M	D	63	11	34	
N- 9	Sanford Allen		D	81	6	Mh	665	27		Tj	D	..	7	90	Develops water at 74 ft.
N-10	H. C. Harville		D	153.6	6	Mh	609	6.2	11-21-60	M	D	..	248	18	
N-11	P. W. Thompson		D	113	6	Mh	662	23.2	11-21-60	Tj	D	..	18	104	
N-12	T. E. Terry	Johnnie Harris	D	120.0	6	Mh	654	15.2	11-21-60	M	D	63	152	136	Develops water from 40 to 50 ft. See driller's log in table 5.
N-13	Mt. Moriah Elementary School.		D	165	6	Mgs	662	30		Tj	Ps	..	18	260	Supplies 34 students.
N-14	J. D. Terry		D	30	6	Mh	640	15		Tj	D	..	4	108	
N-15	Ira Terry		D	30.8	6	Mb	601	4.9	11-22-60	M	D	..	131	474	
N-16	Jim Steadmon		D	125	6	Mh	632	37.9	11-22-60	Tj	D	..	74	160	
N-17	W. J. Montgomery		D	47.4	6	Mh	622	26.3	11-22-60	M	D	..	60	32	
N-18	Malcolm Hurst		D	67.8	6	Mb	611	30.9	11-18-60	M	D	..	46	256	
N-19	Lonnie Rutherford		D	27.8	6	Mb	622	10.3	11-22-60	M	D	64	60	350	
N-20	Pete Russell		D	47.8	6	Mb	626	13.6	11-22-60	Tj	D	..	32	330	
N-21	Mitchell Latham		D	35.0	6	Mb	605	4.6	11-22-60	M	D	63	39	286	
N-22	Elsie Rutherford		D	26.7	6	Mb	606	8.3	11-22-60	M	D	63	53	724	
N-23	Alexander Estate		D	55.7	6	Mb	617	11.5	11-22-60	M	D	63	53	238	
N-24	Chug Wonder		D	27.1	6	Mb	612	5.3	11-22-60	M	D	..	39	254	
N-25	Ottis Wallace		D	35.0	6	Mb	630	22.1	11-28-60	M	D	..	18	162	
N-26	W. H. Goodwin		D	52.4	6	Mb	620	11.8	11-28-60	Tj	D	..	67	352	
N-27	G. W. Jeffreys		D	24.2	6	Mb	650	7.0	11-28-60	M	D	64	131	148	
N-28	Ben Dutton		D	60	6	Mb	630	8		Tj	D	..	32	222	

N-29	Drayton Borden	.....	D	189.4	6	Mgs	640	52.1	11-18-60	M	D	63	53	256	Reported to contain carbon dioxide and gas.
N-30	Lee McCord	.....	D	116.1	6	Mh	660	38.9	11-18-60	Tj	D	..	32	124	
N-31	Johnnie Stevenson..	.....	Du	21.1	36	plP	655	10.9	11-29-60	M	D	..	39	166	
N-32	J. M. McCary	.....	D	30.0	6	Mb	640	6.2	11-29-60	M	D	..	74	138	
N-33	D. M. Stevenson ...	.....	D	55.6	6	Mb	660	16.3	11-28-60	N	N	..	...	.....	Well No. 18 (Johnston, 1933, pt. 2, table 26).
N-34	Apostolic Christian Church.	.....	D	.....	6	Mb	630	5	.....	Pp	Pc	..	11	188	
N-35	Clark Latham.....	.....	Du	10	36	plP	620	2	.....	Tj	D	..	11	170	Supplies 4 houses and store.
N-36	J. P. Letson.....	.....	D	58	6	plP	650	18	.....	Tj	D	..	18	24	Develops water at 43 and 56 ft.
O- 1	L. P. Jones	.....	D	48.3	6	Mh	738	28.9	11-30-60	M	D	..	11	20	
O- 2	Bertha Cole	.....	D	21.4	6	Mh	703	3.5	11-30-60	M	D	..	32	114	
O- 3	.....	.....	S	.....	...	Mh	659	.....	.....	...	N	63	...	.....	Known as Chalybeate Spring. Nonflowing on 11-30-60.
O- 4	Thomas Hale	.....	S	.....	...	Mh	678	.....	.....	...	D	62	11	122	Estimated flow 5 gpm on 11-29-60.
O- 5	Willy Glover.....	.....	D	39.7	6	Mh	692	6.5	11-29-60	M	D	..	39	32	
O- 6	Mary E. Letson	.....	D	71.4	6	Mh	668	12.7	11-28-60	M	D	63	25	74	
O- 7	J. H. Jones.....	.....	D	35.3	6	Mh	712	10.2	11-28-60	M	D	..	32	108	
O- 8	Leone Gipson	.....	D	80.5	6	Mh	695	6.9	11-28-60	M	D	63	11	24	
O- 9	B. B. Jones	S. T. Little	D	108	6	Mh	647	38	.....	Tj	D	..	18	28	See driller's log in table 5.
O-10	Charlie Montgomery.	.....	D	54.4	6	Mgs	635	13.3	11-29-60	M	D	63	11	252	
O-11	Louie Pruitt.....	.....	D	55.9	6	Mh	703	2.8	11-29-60	M	D	..	25	18	
O-12	Luther Thrasher ...	.....	D	41.2	6	Mh	675	16.1	11-30-60	M	D	..	25	70	
O-13	Pat Gillespie.....	.....	D	33.9	6	Mh	703	10.1	11-30-60	M	D	..	60	144	
O-14	Lizzie M. Turner...	A. G. Hare	D	125	6	Mb-Mh	692	10	.....	Tj	D	..	18	386	Do.
O-15	M. D. Welborn.....	.....	D	44.1	6	Mh	679	3.0	11-30-60	M	D	63	53	182	
O-16	L. M. Austin.....	.....	D	35.9	6	Mh	693	14.5	11-29-60	M	D	..	25	40	
O-17	Bertha Boyd.....	.....	D	103.8	6	Mh	655	14.5	11-29-60	M	D	62	89	254	
O-18	Clark Hodges.....	.....	Du	23.9	36	plP	673	8.2	11-29-60	M	D	..	32	110	
O-19	Anderson Livingston	.....	D	102	6	Mh	651	40	.....	Tj	D	..	18	102	
O-20	... do	.....	D	76.9	6	Mb	632	16.8	12- 5-60	M	D	63	4	212	
O-21	T. J. Moates.....	A. G. Hare	D	205	6	Mh	635	20	.....	T	D	..	18	90	Bedrock at 21 ft. Reported to contain carbon dioxide and iron. See driller's log in table 5

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
O-22	J. T. Lemay		D	33.5	6	Mh	653	14.5	12- 5-60	Tj	D	..	11	218	
O-23	W. E. Montgomery		D	32.5	6	Mh	685	5.5	12- 5-60	M	D	63	18	32	
O-24	Neal Austin		Du	24	36	pIP	675	14	.....	Tj	D	..	82	216	Bedrock at 24 ft. Inadequate for domestic supply.
O-25	Virgil Sandlin		Du	18.2	36	pIP	685	4.2	12- 2-60	Tj	D	..	...	.....	
O-26	.....	.....	D	22.7	6	Mh	650	10.5	12- 2-60	N	N	..	11	124	
O-27	H. C. Gillespie		D	168	6	Mh	635	78	.....	Tj	D	..	4	132	
O-28	.....	.....	D	21.0	6	Mb	660	19.8	12- 5-60	N	N	..	25	212	
O-29	Rotha McAfee		D	200	6	Mh	650	46.6	12- 5-60	M	D	62	67	20	
O-30	H. J. Steele	Johnnie Harris	D	174	6	Mh	655	40	.....	Ts	D	..	117	24	Casing: 6-in. to 24 ft. Develops water at 50 ft. Bail tested at 10 gpm in August 1960. See driller's log in table 5.
O-31	Thomas Owen		D	40	6	Mb	630	15	.....	Tj	D	..	11	240	
O-32	City of Moulton		S	.....	...	Mb	620	....	.....	...	Pm	64	21	268	Known as Gin Spring. 20,000 gpd pumped to filter plant. Estimated flow 50 gpm on 12-2-60.
O-33	... do	A. G. Hare	D	260	6	Mb	650	15.3	12- 2-60	N	N	..	...	.....	Observation well (see fig. 5). Listed as Law-1 in

O-34	... do	... do	D	143	6	Mb	640	9.8	6-22-54	N	N	..	...	.....	Federal observation well network, Alabama district. Casing: 6-in. to 20 ft. Pump tested at 20 gpm. See driller's log in table 5. Water reported to contain sulfur.
O-35	... do	.....	S	.....	...	Mb	630	.....	.....	...	Pm	63	14	158	Casing pulled. Dry test well. See driller's log in table 5. Known as Town Spring. Spring No. 46 (Johnston, 1933, pt. 2, table 27). 20,000 gpd pumped to filter plant. Estimated flow 50 gpm on 12-2-60.
O-36	... do	H. W. Peerson Drilling Supply Co.	D	254	10, 8, 6	Mb-Mh	655	13.2	7- 8-54	T	Pm	64	7	126	Original 6-in. well drilled by A. G. Hare. Casing: 10-in. to 22 ft.; 8-in. to 159 ft.; perforated from 22 to 159 ft. Reported drawdown 21 ft. after 24 hrs. pumping 210 gpm on 7-8-54. Yields 75,000 gpd. See driller's log in table 5 and chemical analysis in table 3.
O-37	Franklin Smith	.....	Du	17.6	36	plP	665	9.9	12- 5-60	Tj	D	..	25	208	
O-38	Arthur Simmons	.....	D	36.2	6	Mb	650	25.8	12- 5-60	M	D	63	74	272	
O-39	A. J. Terry	.....	D	21.0	6	Mb	640	12.7	12- 2-60	M	D	..	32	312	
O-40	.....	.....	D	35.6	6	Mb	660	22.8	12- 2-60	N	N	..	53	252	
P- 1	G. W. Burch	.....	D	51.4	6	Mh	758	41.5	12- 6-60	M	D	..	14	34	
P- 2	Ervin Armor	.....	D	51.3	6	Mh	783	42.5	12- 6-60	M	D	..	32	62	
P- 3	Hopson Gillespie...	.....	D	67.4	6	Mh	740	28.4	9- 7-60	M	D	63	11	42	Observation well (see fig. 5).
P- 4	John Blalock	.....	D	54.4	6	Mh	762	29.3	12- 6-60	Tj	D	..	11	84	
P- 5	B. C. Compton	.....	D	49	6	Mh	738	25	.....	Tj	P D	..	11	52	Supplies cafe, store, service station, barber shop, and 4 houses. Water contains sulfur.

Table 4.–*Records of wells and springs in Lawrence County*–Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
P- 6	-- Bonds		D	32.6	6	Mh	700	23.2	12- 6-60	M	D	..	18	26	
P- 7	W. H. Moles		D	15.1	6	Mh	745	2.7	12- 6-60	M	D	..	4	12	
P- 8	Morris Chapel		D	71.6	6	Mgs	715	25.9	12- 6-60	N	N	..	11	162	
P- 9	S. T. Reeves		D	92.6	6	Mgs	703	30.5	12- 6-60	M	D	..	4	162	
P-10	O. E. Shelton	E. G. Delashaw	D	64.3	5	Mh	765	42.2	9- 7-60	Tj	D	..	11	96	
P-11	Midway Elementary School.	do	D	100	4	Mgs	750	50	1950	Tj	Ps	66	11	268	Inadequate supply for 141 students. Water reported to contain iron.
P-12	Talmadge Barnes		D	63.3	6	Mh	768	44.1	12- 6-60	M	D	63	18	22	
P-13	Alva Wade		D	54.8	6	Mh	770	34.3	12- 6-60	M	D	..	7	78	
P-14	Mrs. R. H. McCullough.		D	48.6	6	Mh	711	30.8	12- 9-60	M	D	..	32	36	
P-15	C. N. Butler		D	115.6	6	Mh	730	28.4	12- 9-60	M	D	63	18	42	Inadequate for domestic supply.
P-16	Ward Gillespie		D	85	6	Mh	738	26.4	12- 9-60	Tj	D,S	..	25	48	Supplies 10,000 chickens and 2 houses.
P-17	Guy Shelton		D	58.5	6	Mh	695	3.6	12- 9-60	M	D	63	11	54	
P-18	Vera Compton		D	39.4	6	Mgs	690	13.5	12- 9-60	M	D	..	18	202	
P-19	Concrete Products Co.		D	100	6	Mgs	655	20	.....	Tj	Ind	..	18	194	Develops water at 60 ft. Supplies cement block plant.
P-20	T. L. Hill		D	27.7	6	Mh	672	18.2	12- 9-60	M	D	62	11	52	
P-21	Charles McWhorter		D	20.6	6	Mh	686	3.8	12- 9-60	M	D	..	25	40	
P-22	J. W. Byars		D	38.9	6	Mgs	668	4.0	12- 9-60	M	D	..	18	348	

P-23	J. A. McWhorter		D	31.2	6	Mh	720	13.1	12- 9-60	M	D	..	11	28	
P-24			D	57.0	6	Mh	716	24.2	12- 9-60	N	N	..	11	32	
P-25	G. W. Hill		D	27	6	Mh	652	15		Tj	D	..	18	82	
P-26	Earl Clark		D	104.9	6	Mgs	640	19.1	12-13-60	M	D	62	18	180	
P-27	Kyle Clark		D	74	6	Mgs	660	25		Tj	D	..	11	278	Inadequate domestic supply before drilling from 62 to 74 ft.
P-28	A. L. Bryant		D	40.2	6	Mh	655	4.9	12-13-60	Pp	D	..	39	118	
P-29	Almon McWhorter		D	156	6	Mh	665	60		Tj	D	..	18	24	
P-30	Ernest Sapp		D	54.9	6	Mh	620	4.0	12-13-60	M	D	63	18	40	
P-31	Mrs. J. W. Tucker		D	45.1	6	Mh	660	11.8	12-13-60	M	D	..	18	62	
P-32	W. E. Coffey		D	74.8	6	Mh	680	37.9	12-13-60	M	D	63	89	160	
P-33	C. V. Jacobs		D	54.0	6	Mb	670	24.6	12-13-60	M	D	63	46	374	
P-34	Alice Jo Young		D	73.6	6	Mb	645	22.4	12-13-60	M	D	63	53	394	Develops water above bedrock. Reported to be good domestic supply.
P-35	Wilbur Jackson		D	69.4	6	Mb	645	39.6	12-14-60	M	D	63	25	352	
P-36	Benson Bryant		D	32.5	6	pIP	620	7.1	12-14-60	M	D	..	18	312	
P-37	Cleo Clark		D	62.9	6	Mh	625	34.8	12-13-60	M	D	63	11	106	
Q- 1	Harold Jenkins		D	50.6	6	Mh	605	23.3	12-19-60	M	D	63	32	164	
Q- 2	Enon Church	A. G. Hare	D	150	6	Mh	620			Tj	D	..	96	24	Reported to contain carbon dioxide and sulfur. See driller's log in table 5.
Q- 3	Sally West		D	133.0	6	Mh	605	19.7	12-30-60	M	D	63	67	60	
Q- 4	Talbert Brown		D	49.4	6	Mb	645	40.1	12-30-60	M	D	..	60	164	
Q- 5	Ada Waits		D	41.4	6	Mb	640	22.0	12-30-60	M	D	..	32	242	
Q- 6	Otis Gentry		D	81.7	5	Mh	645	20.8	1- 4-61	M	D	63	11	104	
Q- 7	Paul Wiley		D	63.7	6	Mb	635	10.4	1- 3-61	M	D	63	18	168	
Q- 8	T. L. Cartwright		D	61.6	6	Mb	640	31.4	12-30-60	M	D	63	11	146	
Q- 9	Emmett Bussey		D	50.7	6	Mb	630	38.2	12-30-60	N	N	..	11	214	
Q-10	Maude Sullivan		Du	17.6	36	pIP	625	17.0	12-30-60	M	D	..	39	226	
Q-11	George Burchell		D	32.6	6	Mb	620	14.2	12-30-60	M	D	..	18	240	
Q-12	Laura Owen		D	53.3	6	Mb	650	13.8	12-19-60	M	D	..	131	616	
Q-13	Eulus Hill		D	73.0	6	Mb	650	22.1	12-19-60	Tj	D	63	46	204	
Q-14	Carl Ratcliff		D	63.3	6	Mb	625	16.7	12-19-60	M	D	..	60	242	
Q-15	U. C. Speake		Du	29.9	36	pIP	645	23.5	12-30-60	Tj	D	..	25	220	
Q-16	Tommy Gipson		D	41.8	6	Mb	620	5.8	12-30-60	M	D	..	67	286	
Q-17	Grady Gillespie		D	164.0	6	Mb	630	8.4	1- 3-61	M	D	63	60	362	Reported to contain sulfur.
Q-18	Edward Gillespie		D	99.3	6	Mb	650	6.6	1- 3-61	M	D	63	11	240	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
Q-19	Mrs. W. R. Jackson	.....	D	59.5	6	Mb	640	13.1	1- 3-61	M	D	..	32	240	Inadequate for domestic supply.
Q-20	Don Alexander	.....	D	45.4	6	Mb	645	6.1	1- 3-61	N	N	..	46	246	
Q-21	Speake High School	A. G. Hare	D	140	6	Mb	640	10	10- -53	Tj	Ps	..	25	232	Casing: 6-in. to 14 ft. Develops water at 82 ft. Reported 10 ft. drawdown after bailing 500 gallons. Supplies 475 students. See driller's log in table 5.
Q-22	Mac Wiley	.....	D	37.2	6	Mb	625	14.1	12-30-60	M	D	..	11	176	
Q-23	Louis Osborne	.....	D	34.8	6	Mb	645	11.6	1- 4-61	Pp	D	..	18	238	
Q-24	-- Sandlin	Greater Huntsville Oil and Gas Co.	D	2,001	...	.....	636	.....	.....	..	N	..	...	.....	Oil test well (Semmes, 1929, p. 136-138; Bowles, 1941, p. 30-32).
Q-25	J. A. Templeton	.....	D	59.1	6	Mb	635	5.0	12-19-60	M	D	63	39	262	
Q-26	F. W. Looney	.....	D	48.7	6	Mb	685	9.0	1- 4-61	M	D	..	67	1,310	
Q-27	Mrs. Olene Heidt	.....	D	90.3	6	Mb	640	13.0	9- 7-60	M	D	63	46	182	
Q-28	Luther Hampton	.....	D	42.0	6	Mb	642	13.3	9- 7-60	M	D	..	74	246	
Q-29	Shirley Smith	Moulton Valley Oil Co.	D	2,120	...	.....	655	.....	.....	..	N	..	...	.....	Observation well (see fig. 5). Oil test well Goyer No. 1 (Semmes, 1929, p. 131-132; and Bowles, 1941, p. 32-33).

Q-30	... do	B. E. Davis	D	1,603	8	Mb	655	21.3	1- 3-61	N	N	..	18	282	Oil test well (McGlamery, 1955, p. 241-246).
Q-31	... do	.....	S	.....	...	Mb	655	.....	.....	..	N	62	11	214	Known as Miller Spring. Estimated flow 20 gpm on 1-3-61.
Q-32	Mrs. W. R. Jackson.	Mid-Southern Petroleum Co.	D	2,001	10	.....	640	.....	.....	..	N	..	...	.....	Oil test well (McGlamery, 1955, p. 217-227).
Q-33	Shirley Smith	.....	D	38.0	6	Mb	655	25.2	1- 3-61	N	N	..	39	244	
Q-34	... do	.....	D	18.2	6	Mb	665	10.3	1- 4-61	M	D	..	11	152	
Q-35	Chenault Estate ...	.....	D	55.7	6	Mb	675	21.4	1- 4-61	M	D	..	46	298	
Q-36	Ursley Wallace	.....	D	13.5	6	Mb	670	4.6	1- 4-61	M	D	..	18	264	
Q-37	A. V. Aday.....	.....	D	47.0	6	Mh	720	24.6	1- 4-61	M	D	63	25	136	
Q-38	Ernest Sanford.....	.....	D	62.3	6	Mh	675	17.5	1- 4-61	M	D	63	18	174	
R- 1	Grady Moody	.....	D	212	6	Mh	625	52.0	1- 4-61	Ts	D,S	63	18	166	Reported to contain sulfur.
R- 2	Luther Sherrill.....	.....	D	52.3	6	Mb	640	34.4	1- 6-61	M	D	..	18	242	
R- 3	Will Shelton	.....	D	28.8	6	pIP	640	20.5	1- 6-61	M	D	..	18	48	
R- 4	Amanda Priest.....	.....	D	80.0	6	Mb	665	12.7	1- 6-61	M	D	..	96	344	
R- 5	City of Moulton	H. W. Peerson Drilling Supply Co.	D	185	10, 8	Mb	665	27	12-15-47	T	Pm	63	11	168	Well No. 1. Original 6-in. well drilled by A. G. Hare. Casing: 10-in. to 40 ft.; 8-in. to 90 ft.; perforated from 70 to 90 ft. Reported 37 ft. drawdown after 27½ hrs. pumping 225 gpm on 12-15-47. Average pumpage 75,000 gpd. See driller's log in table 5.
R- 6	... do	... do	D	250	6	Mb-Mh	650	13	7- -46	T	N	63	7	130	Well No. 3. Develops water from 40 to 44 ft. Reported 50 ft. drawdown after bailing 30 gpm July 1946. Used for public supply in summer and fall of 1953. Reported to contain sulfur. See driller's log in table 5.

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
R- 7	Guy Free	.....	D	9.4	6	Mb	640	6.5	1- 6-61	N	N	..	...	.....	
R- 8	City of Moulton	A. G. Hare	D	260	6	Mb	655	18.8	6-22-54	N	N	..	...	.....	Test well No. 11. Bail test indicated 6 gpm yield. Casing pulled. See driller's log in table 5.
R- 9	Bob Almon	.....	D	27.4	6	Mb	650	9.6	1- 6-61	M	D	..	25	204	
R-10	W. L. Parker	.....	D	61.9	6	Mb	665	15.6	1- 6-61	M	D	63	25	258	Inadequate for domestic supply. Nearby well 185 ft. deep reported to contain sulfur.
R-11	A. G. Hare	A. G. Hare	D	312	6	Mh-Mgs	655	8	1- -61	Tj	D	..	11	150	Develops water at 260 ft. See driller's log in table 5.
R-12	Grady Sanderson ...	.....	D	54.6	6	Mb	660	10.0	1- 6-61	M	D	63	46	174	
R-13	Charlie Aldrich	.....	D	60.4	6	Mb	640	17.4	1- 6-61	Tj	D	..	18	204	
R-14	.....	.....	D	45.0	6	Mb	650	21.1	1- 4-61	N	N	..	...	.....	
R-15	-- Jacobs	Fidelity Oil & Gas Co.	D	1,500	..	.....	645	.....	.....	..	N	..	...	.....	Oil test well (Semmes, 1929, p. 135; and Bowles, 1941, p. 28-29). Develops water from 205 to 225 ft.
R-16	J. H. Preuit	.....	D	42	6	Mb	645	.....	.....	Tj	D	..	11	188	

R-17	... do	.....	S	.....	..	Mb	640	.....	.....	..	S	63	4	178	Estimated flow 300 gpm on 1-6-61.
R-18	Wayne Gentry	.....	D	57.2	6	Mb	655	13.1	1- 9-61	M	D	..	53	190	
R-19	Louis Melson	.....	D	28.8	6	Mb	660	10.4	1- 9-61	M	N	..	32	176	
R-20	J. H. Preuit	.....	D	73.4	6	Mb	650	14.4	1- 9-61	M	D	63	39	336	
R-21	Lester Cole	.....	D	34.9	6	Mb	660	16.3	1- 9-61	M	D	..	11	204	
R-22	Wren Elementary School.	.....	D	20	6	Mb	665	8	.....	Tj	Ps	..	18	228	Well No. 33(Johnston, 1933, pt. 2, table 26). Supplies 23 students.
R-23	C. M. Montgomery ..	Johnnie Harris ...	D	333	6	Mh	670	47.3	9- 6-60	M	N	67	74	18	Observation well (see fig. 6). Water reported to contain carbon dioxide.
R-24	Jack Ellis	.....	D	67.4	6	Mb	675	2.9	1- 9-61	M	D	..	145	432	
R-25	J. Armstrong	.....	D	60	6	Mb	690	50	.....	Tj	D	..	18	258	
R-26	R. E. Ellis	A. G. Hare	D	125	6	Mb	680	13	1957	Tj	D	..	25	294	Casing: 6-in. to 6 ft.
R-27	Frank Simpson	.....	D	60.8	6	Mb	665	13.8	1-10-61	M	N	64	74	526	
R-28	Arthur Rogers	.....	D	35.0	6	Mb	670	8.8	1- 9-61	M	D	..	18	250	
R-29	Jess Sparks	.....	D	52.7	6	Mb	645	18.0	1- 9-61	M	D	..	18	220	
R-30	... do	.....	D	62.7	6	Mb	660	39.8	1- 9-61	M	D	63	60	240	
R-31	Louis Melson	.....	D	23.5	6	Mb	655	8.8	1- 9-61	N	N	..	18	200	
R-32	Ed Welbom	.....	D	57.0	6	Mb	685	16.0	1-10-61	M	N	..	11	178	
R-33	G. P. Montgomery ..	.....	D	43.6	6	Mb	675	4.5	1-10-61	M	D	..	32	304	
R-34	Emmett Ellis	.....	D	48.3	6	Mb	740	46.0	1-10-61	M	D	..	11	186	
R-35	J. G. Woodard	.....	Du	33.4	6	IPpv	1,035	21.8	1-10-61	M	D	63	18	150	Well No. 35 (Johnston, 1933, pt. 2, table 26). Dug 36 inches in diameter then installed 6-in. casing and filled around outside.
R-36	.....	.....	D	85.3	6	IPpv	1,010	23.1	1-10-61	M	D	63	18	186	
R-37	Irving Preston	.....	S	.....	..	Mb	710	.....	.....	..	...	63	11	130	Known as Blowing Spring. Estimated flow 100 gpm on 1-10-61.
R-38	G. Parker	.....	D	58.8	6	Mb	705	22.8	1-10-61	M	D	..	18	290	
R-39	G. W. Sparks	.....	D	200	6	Mb	745	79.7	1-10-61	Ts	D	..	11	186	
R-40	Louis Melson	.....	D	63.9	6	Mb	705	53.6	1- 9-61	M	D	..	25	370	
R-41	Jake Alexander Estate.	.....	D	50.2	6	Mb	685	34.8	1- 9-61	N	N	..	103	658	
S- 1	Henry Pearson	.....	D	17.5	6	Mb	645	2.3	1-11-61	M	D	..	11	278	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
S- 2	Orie Jackson		D	42.1	6	Mb	645	11.0	1-12-61	M	D	..	25	236	
S- 3	... do		D	38.1	6	Mb	660	22.2	1-12-61	M	D	..	25	200	
S- 4	Gladys Burch		D	52.2	6	Mb	640	6.1	1-18-61	M	D	..	18	196	
S- 5	Landersville Elementary School.		D	90.5	6	pIP	640	28.5	1-17-61	Tj	Ps	63	32	22	Supplies 21 students. Reported to contain sulfur.
S- 6	Young Bros.		D	28.6	6	Mb	640	5.9	9- 6-60	N	N	..	32	170	Observation well (see fig. 6). Flows part of year.
S- 7	Arthur Young		D	38.5	6	Mb	635	1.2	1-12-61	M	D	..	32	234	
S- 8	Young Bros.		D	38.5	6	Mb	660	13.8	1-12-61	M	D	63	46	362	
S- 9	Farris Hood		D	43.4	6	Mb	670	8.3	1-12-61	M	D	63	18	304	
S-10	Bennie Owens		D	59.8	6	Mb	700	9.4	1-12-61	M	D	..	46	182	
S-11	Roy Cammon		D	26.9	6	Mb	655	8.9	1-12-61	M	D	..	18	276	
S-12	J. T. Letson		D	35.4	6	Mb	665	2.8	1-11-61	M	D	..	11	328	
S-13	Buck Montgomery		D	97.0	6	Mb	705	26.2	1-11-61	M	D	63	60	160	
S-14	Roy Oliver		D	60.4	6	Mb	770	20.5	1-11-61	M	D	..	11	242	
S-15	Dalton Appleton	A. G. Hare	D	430	6	Mb	740	127.5	1-12-61	M	D	..	11	208	
S-16	W. H. Blankinship		D	35.0	6	Mb	685	6.5	1-17-61	M	D	..	32	304	
S-17	Will Ware		D	103.0	6	Mb	685	34.9	1-17-61	M	D	64	46	300	
S-18	John Dotson		D	38.8	6	Mb	640	9.9	1-17-61	M	D	..	46	308	
S-19	R. B. Young		D	100.8	6	Mb	680	13.8	1-17-61	M	D	64	39	214	
S-20	Young Bros.		D	35.0	6	Mb	670	.6	1-17-61	M	D	..	32	256	

S-21	Benny Owens		D	18.9	6	Mb	675	3.3	1-17-61	M	D	..	18	224	
S-22	Mrs. Evelyn Garrison.		Du	27.0	36	pIP	720	23.6	1-12-61	M	D	..	18	74	Inadequate for domestic supply.
S-23	Huff Speaks		S	.....	..	Mb	720	.....	.....	..	S	63	4	244	Known as Warren Spring. Estimated flow 75 gpm on 1-11-61.
S-24	Glenn Whisenant		D	46.9	6	IPpv	1,010	18.6	1-12-61	M	D	64	18	16	
S-25	J. O. Blankinship		D	28.1	6	Mb	675	6.6	1-17-61	M	D	..	11	118	
S-26	Young Bros.		D	64.3	6	Mb	740	53.4	1-17-61	M	D	..	4	306	
S-27	J. W. Mitchell		D	95.6	6	Mb	680	36.7	1-17-61	N	N	65	4	98	Inadequate for domestic supply.
S-28	Hoyt Whisenant		D	49.0	6	IPpv	970	31.3	1-17-61	M	D	..	11	158	
T- 1	Hubert Elkins		D	43.2	8	Mb	630	15.9	1-18-61	M	D	64	39	266	
T- 2	Fanny Stevenson		D	36.2	6	pIP	645	21.5	1-18-61	M	N	..	117	108	
T- 3	E. K. Martin		D	42.9	6	Mb	620	24.5	1-18-61	M	D	..	32	362	
T- 4	Ben Abbott		D	52.3	6	Mb	645	7.3	1-18-61	M	D	..	18	166	
T- 5	R. L. Camp		D	61.1	6	pIP	620	10.7	1-18-61	N	N	63	11	132	
T- 6	.....	.....	Du	18.2	36	pIP	645	7.9	1-18-61	Tj	D	..	39	284	
T- 7	R. H. Gaston		D	93.1	6	Mb	680	26.1	1-18-61	M	D	64	124	394	
T- 8	Wyatt Counts		D	26.2	8	pIP	645	11.6	1-18-61	M	D	..	60	90	
T- 9	Mt. Hope Church of Christ.		D	53.5	6	Mb	650	22.3	9- 6-60	N	N	..	7	168	Observation well (see fig. 6).
T-10	Neal Williams		D	47.0	6	Mb	640	16.0	1-23-61	Pp	D	..	18	170	
T-11	H. W. Mitchell		D	29.0	6	Mb	625	6.7	1-18-61	N	N	..	18	174	
T-12	Clay Councill		Du	17.0	36	pIP	640	12.4	1-23-61	M	D	..	11	180	
T-13	Grady Martin		D	33.8	6	Mb	640	7.6	1-23-61	M	D	..	25	280	
T-14	Mrs. Womack		D	64.3	6	Mb	640	12.1	1-23-61	M	N	..	11	242	
T-15	J. E. Counts		D	27.6	6	Mb	640	1.4	1-23-61	M	D	..	39	302	
T-16	Mt. Hope High School.	A. G. Hare	D	370	6	Mh	655	.....	.....	Tj	Ps	..	138	"18	Supplies 4 rest rooms for 330 students. Reported high carbon dioxide content.
T-17	Mrs. Smith		Du	16	36	pIP	655	10	1- -61	Tj	Ps	..	11	182	Supplies lunchroom and drinking fountains for 330 students at Mt. Hope High School.
T-18	Will Alexander		D	59.3	6	Mb	660	17.6	1-24-61	M	N	..	11	210	
T-19	Horace Smith		Du	10	36	Mb	670	8	.....	Tj	D,S	..	32	424	
T-20	J. D. Reed		D	68.8	6	Mb	710	8.6	1-24-61	N	N	..	4	300	
T-21	... do		Du	26.1	36	pIP	745	19.1	1-24-61	M	D	..	11	36	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
T-22	J. D. Reed		D	74.2	6	Mb	700	8.6	1-24-61	M	N	64	11	216	
T-23	... do		D	42.6	6	Mb	645	6.3	1-23-61	M	N	..	53	264	
T-24	W. D. Martin		D	37.7	6	Mb	645	2.0	1-23-61	M	D	..	74	340	
T-25	A. M. Stephenson		Du	9.7	36	pIP	675	1.5	1-23-61	N	N	..	39	352	Reportedly went dry once in 60 years.
T-26	Ray Hopkins		D	62.5	6	Mb	670	7.1	1-23-61	M	N	..	53	280	
T-27	Phil Boyles		D	72	6	Mb	665	20	1- -61	Tj	D	..	25	278	Develops water at 25 ft.
T-28	Joe Thrasher		D	18.8	6	Mb	730	11.7	1-24-61	M	S	64	18	270	
T-29	Howard Shields		Du	21.4	36	pIP	740	4.1	1-24-61	M	D	..	18	134	
U- 1	William B. Bankhead National Forest.		S	.....	..	IPpv	950	.....	.....	..	N	60	7	16	Known as Poplar Spring. Estimated flow 2 gpm on 1-30-61.
U- 2	... do		Du	27.9	36	IPpv	995	23.3	1-30-61	M	D	..	7	18	
U- 3	J. L. Sanford		S	.....	..	IPpv	940	.....	.....	..	N	58	11	14	Estimated flow 2 gpm on 1-30-61.
U- 4	William B. Bankhead National Forest.		S	.....	..	IPpv	815	.....	.....	..	N	58	4	8	Known as Kinlock Spring. Supplied CCC Camp in 1935. Estimated flow 5 gpm on 1-30-61.
V- 1	... do		Du	23.7	36	IPpv	1,005	7.0	2- 2-61	M	D	..	103	106	
V- 2	... do		S	.....	..	Mb	640	.....	.....	..	N	..	...	.....	Reported flow 1,500 gpm in January 1961.
V- 3	... do		S	.....	..	Mb	640	.....	.....	..	N	..	...	.....	Reported flow 200 gpm in January 1961.

V- 4	... do	.....	Du	17.8	36	Ppv	970	14.3	1-30-61	N	N	..	103	82	
V- 5	Hudson Sandlin	.....	Du	40.2	36	Ppv	960	35.2	2- 2-61	Tj	D	..	25	58	
V- 6	William B. Bankhead National Forest.	.....	Du	40	36	Ppv	990	26	.....	Tj	D	..	11	40	Supplies house, warehouse, and ranger's office.
V- 7	... do	.....	S	.....	..	Mp	620	.....	.....	..	N	60	11	60	Estimated flow 20 gpm on 1-30-61..
V- 8	... do	.....	S	.....	..	Mb	620	.....	.....	..	N	60	4	146	Do.
V- 9	... do	.....	D	45	6	Ppv	900	39.4	2- 2-61	M	D	..	11	46	
W- 1	Shirley Smith	.....	Du	35.0	36	Ppv	960	28.0	2- 3-61	Tj	D	..	39	76	
W- 2	William B. Bankhead National Forest.	.....	Du	17.5	60	Ppv	865	1.0	2- 3-61	N	N	..	18	96	
W- 3	... do	.....	Du	40.2	36	Ppv	895	7.4	2- 3-61	M	D	..	53	56	
W- 4	... do	.....	S	.....	..	Ppv	900	.....	.....	..	D	60	7	20	Nonflowing on 2-3-61.
W- 5	John England	.....	D	55.9	6	Ppv	750	51.2	2- 3-61	N	N	..	18	34	Inadequate for domestic supply.
W- 6	M. P. Borden	.....	D	68.2	6	Ppv	885	47.2	2- 3-61	M	D	60	11	92	Reported to contain objectionable quantities of iron.
X- 1	Olon Hill	A. G. Hare	D	100	6	Mb	675	6	2- -61	Tj	D	..	25	420	Develops water from 75 to 80 ft.
X- 2	William B. Bankhead National Forest.	.....	S	.....	..	Mp	680	.....	.....	..	N	58	11	56	Estimated flow 20 gpm on 2-8-61.
X- 3	... do	.....	D	47.3	6	Ppv	840	21.2	2- 8-61	N	N	..	32	26	
X- 4	G. D. Sims	.....	D	40.5	6	Mp	750	23.5	2- 9-61	M	D	..	11	96	
X- 5	B. J. Crow	.....	D	51.0	6	Mb	660	11.1	2- 9-61	Tj	D	..	11	184	
X- 6	Jim Asherbranner ..	H. N. Crowe Drilling Co.	D	65.2	6	Mb	680	30.5	2- 9-61	M	D,S	62	11	40	Develops water from 51 to 54 ft. Reported to contain sulfur. See driller's log in table 5.
X- 7	G. D. Sims	.....	Du	19.7	36	Ppv	940	3.8	2- 9-61	N	N	..	18	20	
X- 8	L. Z. Williams	.....	D	111.7	6	Ppv	980	94.4	2- 9-61	M	N	..	...	.....	Inadequate for domestic supply.
X- 9	William B. Bankhead National Forest.	.....	Du	35.2	36	Ppv	865	20.3	2- 3-61	M	D	..	11	38	
X-10	... do	.....	Du	34.9	36	Ppv	980	26.7	2- 3-61	N	N	..	...	.....	
X-11	... do	.....	Du	19.1	36	Ppv	1,005	7.6	2- 8-61	M	D	..	18	26	
X-12	... do	.....	Du	27.9	36	Ppv	1,000	16.9	2- 8-61	M	D	..	18	26	
X-13	... do	.....	Du	22.4	36	Ppv	890	5.9	2- 8-61	N	N	..	32	50	
X-14	... do	.....	D	31.8	6	Ppv	900	19.9	2- 8-61	M	D	63	53	88	

Table 4.—*Records of wells and springs in Lawrence County*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
X-15	William B. Bankhead National Forest.	.....	S	.....	..	IPpv	880	.....	.....	..	N	60	18	62	Known as Cave Spring. Estimated flow 5 gpm on 2-8-61.
X-16	... do	.....	D	93.9	6	IPpv	920	12.1	2- 9-61	M	D	..	117	76	Water reported to contain objectionable quantities of iron.
X-17	J. C. York	.....	Du	30.3	36	IPpv	905	12.6	2- 9-61	Tj	D	..	89	54	
X-18	G. W. Luker	.....	D	100	6	IPpv	965	30	.....	Tj	D	..	25	34	Develops water at 30 ft.

Table 5.—*Drillers' logs of selected wells in Lawrence County*

	Thickness (feet)	Depth (feet)
Well F-28		
Owner: City of Courtland — Driller: Miller Drilling Co.		
Soil	20	20
Limestone and chert	36	56
Weathered rock (water zone)	4	60
Limestone and chert	16	76
Well F-31		
Owner: State of Alabama — Driller: Hurst Machine Works		
Soil	53	53
Limestone and chert	17	70
Limestone	35	105
Limestone and chert	30	135
Limestone	5	140
Chert	5	145
Limestone and chert	10	155
Limestone	45	200
Limestone and chert	40	240
Well G-2		
Owner: Mrs. Malcolm Lane — Driller: Adams-Massey Drilling Co.		
Soil	80	80
Limestone and chert	115	195
Limestone - hard, gray	75	270
Shale - dark gray	13	283
Well G-30		
Owner: City of Courtland — Driller: Adams-Massey Drilling Co.		
Mud - rock at 3.5 ft	4	4
Mud	15	19
Cave	2	21
Limestone rock	4	25
Limestone - hard (water at 46 ft.)	21	46
Limestone - hard (water at 96 ft.)	50	96
Limestone - hard (water at 107 ft.)	11	107
Limestone - medium hard	18	125
Limestone - medium hard, chert at top (water at 208 ft.)	113	238

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well G-31		
Owner: City of Courtland — Driller: Miller Drilling Co.		
Soil	28	28
Lime rock	13	41
Crevice (water zone)	1	42
Soft lime rock	86	128
Broken lime rock - chert at top	14	142
Broken lime rock	23	165
Solid lime rock	33	198
Lime - hard	10	208
Broken zone (main water source)	1	209
Lime	17	226
Well H-1		
Owner: E. M. Farrior — Driller: A. G. Hare		
Soil	47	47
Limestone and chert (water at 95 ft.)	48	95
Limestone and chert	70	165
Limestone and chert	95	260
Shale	10	270
Limestone - contained an 18-in. cavity	5	275
Limestone and shale	32	307
Well I-31		
Owner: E. C. Bowling — Driller: S. T. Little		
Soil	7	7
Sand rock (cavity at 65 ft.)	58	65
Limestone and soapstone	141	206
Well J-23		
Owner: R. H. Hale — Driller: Johnnie Harris		
Soil	8	8
Sand rock	57	65
Limestone	1.7	66.7

Table 5.–*Drillers' logs of selected wells in Lawrence County*–Continued

	Thickness (feet)	Depth (feet)
Well J-35		
Owner: Chalybeate Junior High School	Driller: A. G. Hare	
Soil	20	20
Sandstone	50	70
Limestone, sandy	10	80
Limestone, gray	20	100
Well K-2		
Owner: W. H. Witt	Driller: Johnnie Harris	
Soil	18	18
Lime rock, gray	81	99
Well K-28		
Owner: Luther Norton	Driller: Johnnie Harris	
Soil	10	10
White sand (water at 85 ft.)	75	85
White sand	25	110
Well L-11		
Owner: A. J. Colburn	Driller: Johnnie Harris	
Soil	10	10
White sand - asphaltic (water at 16 ft.)	6	16
White sand	42	58
Soapstone	4.1	62.1
Well N-6		
Owner: Hatton Elementary School	Driller: A. G. Hare	
Soil	16	16
Shale, sandy	14	30
Sandstone	2	32
Silt	19	51
Sandstone - asphaltic	34	85
Limestone - sandy	10	95
Sandstone - olive gray	6	101
Limestone - light gray	29	130
Shale	61	191

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well N-6—Continued		
Limestone - light gray	39	230
Shale	50	280
Limestone	90	370
Well N-7		
Owner: Hatton High School	Driller: A. G. Hare	
Soil	15	15
Shale	5	20
Sandstone	15	35
Silt	20	55
Sandstone - asphaltic	35	90
Limestone - sandy	20	110
Sandstone - olive gray	14	124
Limestone	16	140
Shale	60	200
Limestone	40	240
Shale	29	269
Well N-12		
Owner: T. E. Terry	Driller: Johnnie Harris	
Soil	10	10
White sand	30	40
Sandstone (water zone)	10	50
White sand	60	110
Soapstone	10	120
Well O-9		
Owner: B. B. Jones	Driller: S. T. Little	
Soil	10	10
White sand and sandy shale	98	108
Well O-14		
Owner: Lizzie M. Turner	Driller: A. G. Hare	
Soil	15	15
Limestone - gray	30	45

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well O-14—Continued		
Limestone - sandy	15	60
Sandstone	65	125
Well O-21		
Owner: T. J. Moates	Driller: A. G. Hare	
Soil	21	21
Limestone - gray	15	36
Limestone - sandy	14	50
White sandstone - shale at base	100	150
Limestone and shale	55	205
Well O-30		
Owner: H. J. Steele	Driller: Johnnie Harris	
Soil	10	10
Broken lime and open zones	14	24
Lime rock - (water zone at 50 ft.)	26	50
Lime rock - sandy at base	80	130
Sandstone and soapstone - asphalt, gas, and water in sandstone in upper part	44	174
Well O-33		
Owner. City of Moulton	Driller: A. G. Hare	
Red clay	10	10
Boulders and clay	8	18
Limestone - gray	72	90
Limestone - (water zone)	5	95
Limestone - gray	40	135
Limestone - sandy	25	160
Sandstone	97	257
Shale - dark bluish-black	3	260
Well O-34		
Owner: City of Moulton	Driller: A. G. Hare	
Soil	13	13
Broken rock, boulders	9	22

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well O-34—Continued		
Limestone	121	143
Well O-36		
Owner: City of Moulton	Driller: A. G. Hare	
Soil	13	13
Lime rock	12	25
Broken lime rock (water zone)	34	59
Lime rock	14	73
Broken lime rock (water zone)	55	128
Lime - gray	7	135
Lime - sandy	20	155
Sandstone - (water zone) shale at base	93	248
Shale - black	6	254
Well Q-2		
Owner: Enon Church	Driller: A. G. Hare	
Soil, broken lime rock, and sand	75	75
Sandstone	45	120
Sand (water zone)	5	125
Sandstone - shale at base	19	144
Limestone	6	150
Well Q-21		
Owner: Speake High School	Driller: A. G. Hare	
Soil	10	10
Limestone - dark gray (water at 40 ft.)	30	40
Limestone - (water at 82 ft.)	42	82
Limestone	58	140
Well R-5		
Owner: City of Moulton	Driller: A. G. Hare	
Red clay	24	24
Lime boulders & clay	5	29
Solid lime rock	11	40

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well R-5—Continued		
Blue shaley lime	5	45
Lime rock	8	53
Blue shaley lime	1	54
Lime rock, crevices and unconsolidated	16	70
Honeycomb lime (water bearing)	20	90
Lime rock	53	143
Gummy shale	42	185
Well R-6		
Owner: City of Moulton — Driller: H. W. Peerson Drilling Supply Co.		
Soil and sandy clay	14	14
Lime rock	13	27
Solid lime	13	40
Soft lime (water zone)	4	44
Solid lime	6	50
Broken lime (possibly more water)	5	55
Solid lime	5	60
Lime rock with soft places	15	75
Hard lime rock	12	87
Lime rock	16	103
Lime with soft places	22	125
Sandy shale	11	136
Soft lime	14	150
Hard lime	20	170
Lime - sandy	5	175
Soft lime	5	180
Rotten lime - sandy	20	200
Sand rock	35	235
Sand rock	10	245
Shale	5	250
Well R-8		
Owner: City of Moulton — Driller: A. G. Hare		
Soil	25	25
Limestone	125	150
Sandstone	100	250
Limestone	10	260

Table 5.—*Drillers' logs of selected wells in Lawrence County*—Continued

	Thickness (feet)	Depth (feet)
Well R-11		
Owner: A. G. Hare	Driller: A. G. Hare	
Soil	25	25
Limestone	135	160
Sandstone (water zone)	100	260
Shale and lime	52	312
Well X-6		
Owner: Jim Asherbranner	Driller: H. N. Crowe Drilling Co.	
Dirt and clay	24	24
Limestone - gray	27	51
Limestone - (water zone)	3	54
Limestone - gray	11.2	65.2

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A Reconnaissance

By Lawson V. Causey

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Philip E. LaMoreaux
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DIVISION OF WATER RESOURCES

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Chief Hydraulic Engineer

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Prepared by the United States Geological Survey
in cooperation with the
Geological Survey of Alabama

UNIVERSITY, ALABAMA

1965

STATE OF ALABAMA

Honorable George C. Wallace, Governor

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AND
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University, Alabama
August 13, 1965

Honorable George C. Wallace
Governor of Alabama
Montgomery, Alabama

Dear Governor Wallace:

I have the honor to transmit the manuscript of a report entitled "Geology and Ground-Water Resources of Cherokee County, Alabama, a Reconnaissance" by Lawson V. Causey, with a request that it be printed as Bulletin 79 of the Geological Survey of Alabama.

According to the report, the chief sources of water for wells and springs in the county are the Conasauga Formation and Cambrian and Ordovician dolomites. Ground water in Cherokee County is used primarily for domestic, stock, and school supplies in rural parts of the county. The estimated average use of water from wells and springs in the county in 1961 was about 700,000 gallons daily.

The chemical quality of ground water is usually good except for the hardness of water from some wells developed in the Conasauga Formation and the Chickamauga Limestone, and the excessive iron concentration reported in water from the Red Mountain and Pottsville Formations.

Respectfully,

Philip E. LaMoreaux

Philip E. LaMoreaux
State Geologist

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GEOLOGY AND GROUND-WATER RESOURCES OF CHEROKEE COUNTY, ALABAMA

A Reconnaissance

By Lawson V. Causey

ABSTRACT

Cherokee County is underlain by consolidated rocks that range in age from Early Cambrian to Pennsylvanian. Unconsolidated deposits of sand, gravel, and clay overlie the Conasauga Formation in parts of the Coosa Valley.

Ground-water supplies are obtained chiefly from the Conasauga Formation, the Cambrian or Ordovician dolomites undifferentiated, and the Pottsville Formation. Wells yield as much as 40 gpm (gallons per minute) of water from the Conasauga Formation; 7 to 50 gpm from the Cambrian or Ordovician dolomites; 6 to 35 gpm from the Floyd Shale; and as much as 30 gpm from the Pottsville Formation. Springs discharge as much as 50 gpm of water from the Weisner Formation; 260 to 970 gpm from the Conasauga Formation; 250 to 3,300 gpm from the Cambrian or Ordovician dolomites; and 20 to 1,700 gpm from the Tuscumbia Limestone and Fort Payne Chert undifferentiated.

Ground water is used primarily for domestic, stock, and school supplies in rural parts of the county. The estimated average use of water from wells and springs in Cherokee County in 1961 was about 700,000 gallons daily.

The chemical quality of ground water is usually good except for the hardness of water from some wells developed in the Conasauga Formation and Chickamauga Limestone, and the excessive iron concentration reported in water from the Red Mountain and Pottsville Formations. The median temperature of ground water in Cherokee County is about 60° F.

INTRODUCTION

PURPOSE

Ground-water supplies in some areas of Alabama have become inadequate owing to the increasing use of water for industrial expansion, growth in population, and modernization of rural homes. In order to meet the increased demands, general ground-water information is needed to aid in the development of available supplies. A study of the ground-water resources of Alabama is being made

by the U.S. Geological Survey in cooperation with the Geological Survey of Alabama. This investigation was made to collect sufficient information to outline in general terms the occurrence, quantity, and quality of ground water in Cherokee County. The work was under the direct supervision of William J. Powell, district geologist in charge of ground-water investigations in Alabama for the U.S. Geological Survey.

AREA OF INVESTIGATION

Cherokee County, in northeast Alabama, has an area of 600 square miles and, according to the 1960 census, a population of 16,303. The county is primarily rural; the incorporated towns are Centre, Cedar Bluff, Gaylesville, and Leesburg. Centre, the county seat, had a population of 2,392 in 1960. The area of study and areas of other ground-water studies are shown in figure 1.

The economy of Cherokee County is mainly agricultural. Industrial development is limited to the production of lumber, pulpwood, and a small amount of textile products and apparel. Many residents commute to work in adjacent Calhoun and Etowah Counties, and Georgia.

TOPOGRAPHY AND DRAINAGE

Cherokee County lies almost entirely within the Tennessee section of the Valley and Ridge physiographic province, which is characterized by northeastward-trending valleys and ridges resulting from the erosion of extensively folded and faulted beds. A small area in the northwestern part of the county is in the Cumberland Plateau section of the Appalachian Plateaus province (U.S. Geological Survey, 1946).

The county can be divided topographically into three areas. One area lies north of the Gadsden Fault (pl. 2) and consists chiefly of relatively narrow northeastward-trending valleys and ridges. A second area is of low relief and consists of the 10- to 12-mile wide Coosa Valley, which occupies more than the center third of the county. A third area, in the southeastern part of the county, comprises steep and rugged mountains surrounded by valleys. The maximum relief of the county is about 1,400 feet and the

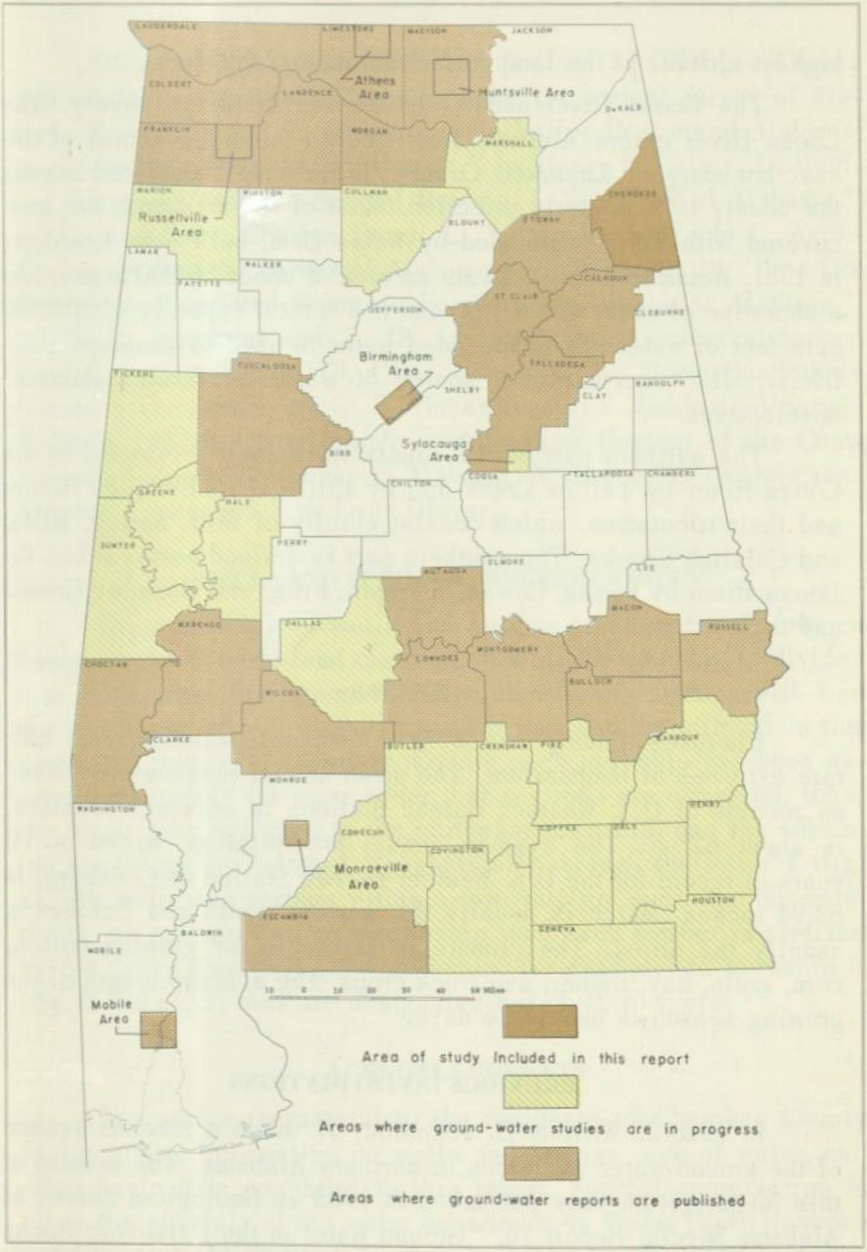


Figure 1.—Area studied and areas of other ground-water studies in Alabama.

highest altitude of the land surface is about 2,000 feet.

The Coosa River and its tributaries drain the county. The Coosa River enters Alabama from Georgia near the center of the east boundary of Cherokee County. It formerly meandered across the county in a westerly direction. Most of the meanders are now covered with water impounded by Weiss Dam, built near Leesburg in 1961. Weiss Reservoir covers an area of about 36,000 acres, has a shoreline of about 426 miles, and has a total capacity of 306,400 acre feet of water. The impounded water is used to generate electricity. The reservoir is a source of water for future industrial development.

The northern part of the county is drained southward to the Coosa River by Yellow Creek and by Little and Chattooga Rivers and their tributaries, which consist chiefly of Wolf, Spring, Mills, and Culstigh Creeks. The southern part is drained northward to the Coosa River by Spring, Cowan, Terrapin, Frog, and Ballplay Creeks and their tributaries.

CLIMATE

Cherokee County has a mild temperate climate with only rare extremes of temperature. The mean annual temperature, based on records of U.S. Weather Bureau Stations in adjacent counties, is about 62° F. The average annual precipitation, based on 70 years of record for the U.S. Weather Bureau Station at Leesburg, is 53.94 inches. March is usually the wettest month and October is usually the driest. The climate is favorable for growing cotton, corn, grain, hay, timber, and truck crops. The average length of the growing season is about 216 days.

PREVIOUS INVESTIGATIONS

In 1928-29 William D. Johnston, Jr. made a reconnaissance of the ground-water resources in northern Alabama. The results of this investigation were published in 1933 as Geological Survey of Alabama Special Report 16, "Ground Water in the Paleozoic Rocks of Northern Alabama" and indicated that adequate quantities of ground water were available in most parts of Cherokee County.

Other reports that describe the geology of Cherokee County and contain other relative data include: Geological Survey of Alabama Special Report 9, "Report on the Valley Regions of Alabama, pt. 2, On the Coosa Valley Region," by Henry McCalley; Geological Survey of Alabama Special Report 14, "Geology of Alabama," by G. I. Adams, Charles Butts, L. W. Stephenson, and C. Wythe Cooke; Geological Survey of Alabama Special Report 19, "Iron Ore Outcrops of the Red Mountain Formation in Northeast Alabama," by E. F. Burchard and T. G. Andrews; U.S. Geological Survey Geologic Atlas, Folio 78, "Description of the Rome Quadrangle [Georgia-Alabama]," by C. W. Hayes; and U.S. Geological Survey Bulletin 1087-E, "Stratigraphy and Uranium Content of the Chattanooga Shale in Northeastern Alabama, Northwestern Georgia, and Eastern Tennessee," by Lynn Glover.

WELL- AND SPRING-NUMBERING SYSTEM

The numbering of wells and springs in Cherokee County is based on the Federal land classification. Each township is divided into 36 sections that are numbered consecutively starting with 1 in the northeast corner of the township and ending with 36 in the southeast corner. In Cherokee County each township has been assigned a letter in the same order that sections are numbered; thus, the letter A is assigned to the northeast township, and the adjoining townships are lettered alphabetically through the letter Y (fig. 2). The wells and springs within a township are numbered consecutively, as are sections in a township, and each number is prefixed by the letter identifying the township; for example, in township F (fig. 2 and pl. 1) they are designated F-1, F-2, F-3, etc.

ACKNOWLEDGMENTS

The author is grateful to the residents of Cherokee County for supplying information on wells and springs, use of water, and other basic data essential to this report. Special appreciation is given the officials of the water department in Cedar Bluff; Hancock and Chestnut Drilling Co., Centre; J. B. Rogers Drilling Co., Leesburg; H. W. Peerson Drilling Supply Co., Birmingham; and Alabama Power Co., Birmingham, for supplying geologic and hydrologic data for wells in the county.

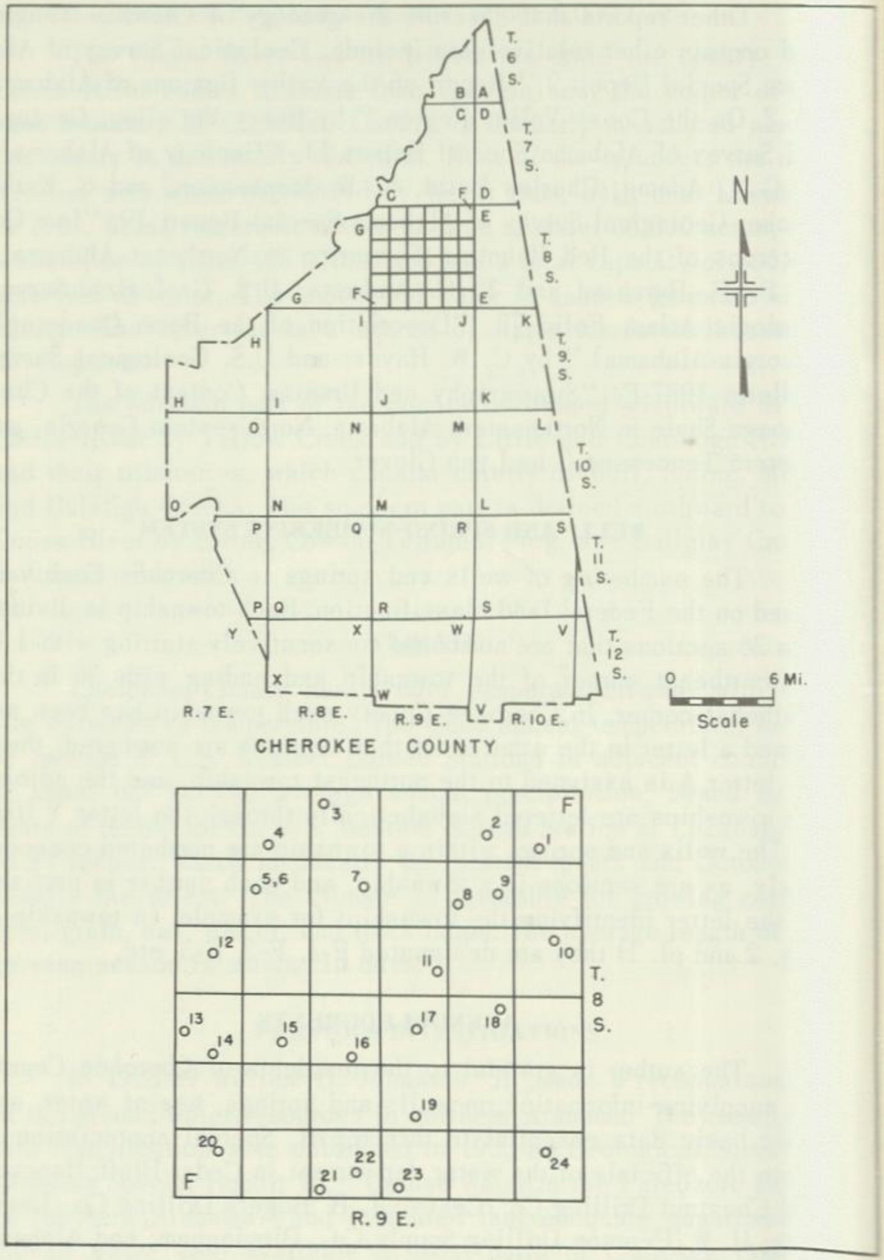


Figure 2.—Well- and spring-numbering system used in this report.

GROUND WATER

SOURCE

Ground water is the water below the land surface that occurs in the zone of saturation—a zone in which all the pore spaces and voids of a rock are filled with water. Ground water is derived from precipitation, and in Cherokee County the precipitation consists of rain and occasional hail, sleet, or snow. Part of the precipitation is carried away by surface streams, part is evaporated directly, and part seeps into the soil. Some of the water entering the soil is returned to the atmosphere by evaporation or transpiration and some moves downward to the zone of saturation to become ground water.

Water seeping down through the soil first enters a zone of aeration which lies between the land surface and the zone of saturation (fig. 3). A part of the water entering the zone of aeration is used to satisfy soil-moisture requirements, being held in this zone by molecular forces which counteract the force of gravity, and a part seeps downward into the zone of saturation. All openings in the zone of saturation are filled with water, and it is from this zone that wells and springs yield water.

OCCURRENCE AND STORAGE

The occurrence and storage of ground water in an aquifer varies from place to place and is controlled chiefly by the porosity of the rock. The porosity or percentage of open space in a rock determines the amount of water the rock will hold. The shape and arrangement of particles; the degree of sorting, compaction, and cementation of the particles; and the amount of fracturing, solution, and recrystallization in the rocks determine the porosity. The permeability of an aquifer is its ability to transmit water under pressure, and is a measure of the rate at which water is transmitted through a unit cross sectional area under a unit hydraulic gradient. Clay generally has a high porosity but a low permeability, and sand and gravel have a lower porosity than clay but have a higher permeability.

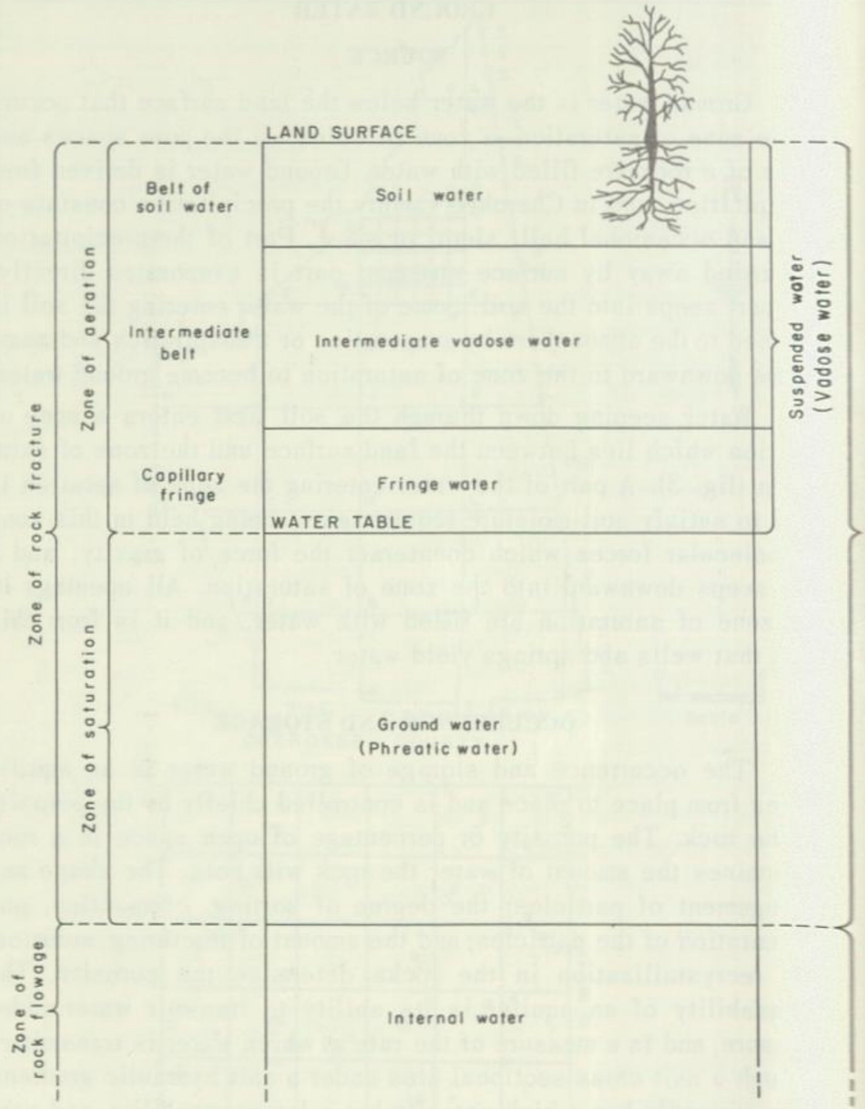


Figure 3.—Divisions of subsurface water.

WATER-TABLE AND ARTESIAN CONDITIONS

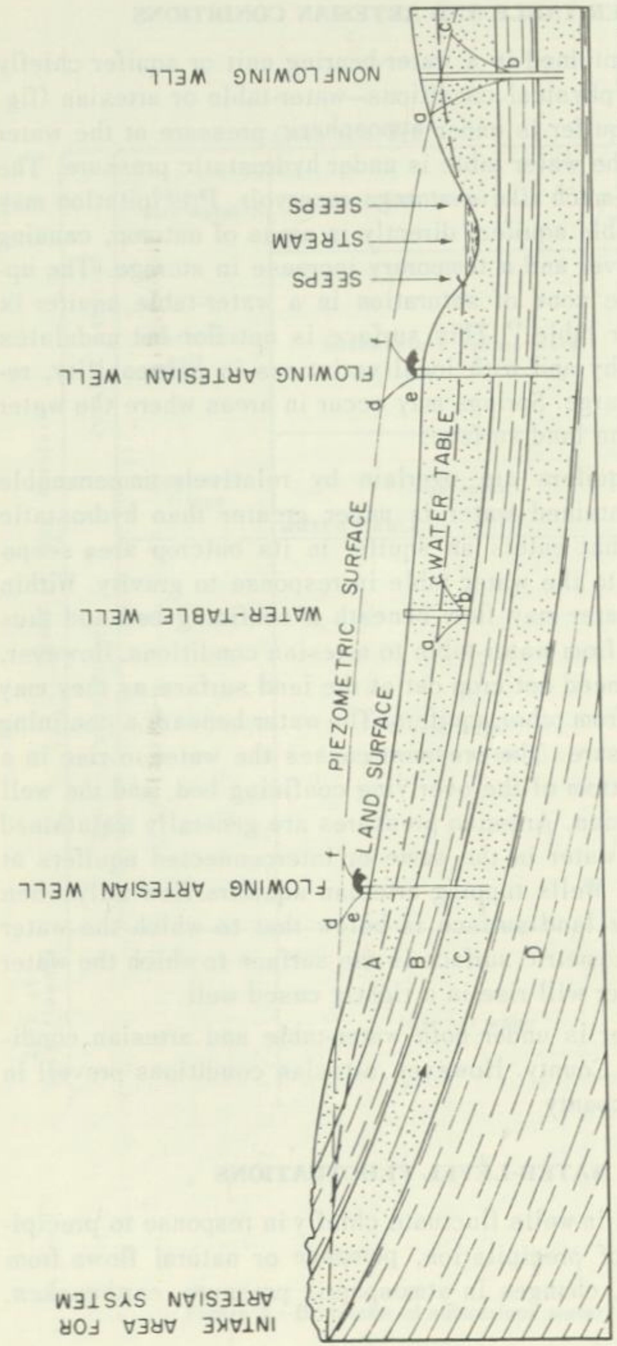
Water is contained in a water-bearing unit or aquifer chiefly under one of two physical conditions—water-table or artesian (fig. 4). Water in an aquifer is under atmospheric pressure at the water table and below the water table is under hydrostatic pressure. The aquifer functions much like a storage reservoir. Precipitation may enter the water-table aquifers directly in areas of outcrop, causing a rise in water level and a temporary increase in storage. The upper surface of the zone of saturation in a water-table aquifer is called the "water table." This surface is not flat but undulates with the topography and with local variations in permeability, recharge, and discharge. Springs may occur in areas where the water table intersects the land surface.

Artesian aquifers are overlain by relatively impermeable beds and the contained water is under greater than hydrostatic pressure. Water that enters an aquifer in its outcrop area seeps slowly downward to the water table in response to gravity. Within the aquifer the water may flow beneath a confining bed and thus there is a change from water-table to artesian conditions. However, artesian aquifers need not crop out at the land surface as they may receive recharge from other aquifers. The water beneath a confining bed is under pressure. The pressure causes the water to rise in a well above the bottom of the overlying confining bed, and the well is said to be artesian. Artesian pressures are generally maintained by the weight of water in the same or interconnected aquifers at higher elevations. Wells tapping artesian aquifers flow only when the altitude of the land surface is below that to which the water will rise. The piezometric surface is the surface to which the water from a given aquifer will rise in a tightly cased well.

Ground water is under both water-table and artesian conditions in Cherokee County. However, artesian conditions prevail in most parts of the county.

WATER-LEVEL FLUCTUATIONS

Water levels in wells fluctuate chiefly in response to precipitation or a lack of precipitation, pumpage or natural flows from wells and springs, changes in atmospheric pressure, earthquakes,



A. Permeable surficial material B. Upper confining bed C Artesian aquifer D. Lower confining bed

abc Cone of depression caused by pumping a water-table or a nonflowing artesian well.

def Cone of depression caused by natural discharge from flowing artesian well.

Figure 4.—Water-table and artesian conditions.

ocean and earth tides, and loading of the land surface.

Fluctuations of water levels in shallow wells and flows from springs in Cherokee County are, for the most part, seasonal or cyclic and are related directly to precipitation. The water levels are highest in early spring because of the continuous and large amount of recharge from the heavy winter rains. Water levels are generally lowest during late autumn or early winter.

Periodic water-level measurements were made in well J-12, which is developed in shale of the Conasauga Formation at Cedar Bluff. Fluctuations in water level in this well for the period of record reflect recharge or a lack of recharge from precipitation (fig. 5).

RECOVERY

Ground water is obtained from wells and springs. Wells in Cherokee County generally are drilled, however, there are many dug wells. Some of the dug wells become dry or almost dry during late summer and fall. To obtain large and sustainable yields from wells, it is generally necessary to drill until sufficient water-bearing fractures or other openings in the bedrock are penetrated.

Under natural conditions a state of dynamic equilibrium, developed over a long period in response to natural recharge and discharge, exists in an aquifer. Pumping from a well tapping an aquifer creates artificial discharge and the aquifer must adjust as a result of this condition. As pumping lowers the water level in the well, water from the aquifer moves toward the well producing a cone of depression in the water table with the pumped well at the center (fig. 4). The lowering of the water level may be rapid when pumping is started, but it gradually declines until the pumping water level becomes nearly stationary, provided the well is pumped at a constant rate within the capacity of the aquifer to transmit water. If this capacity is exceeded, the water level will continue to lower and the yield will decrease to the capacity of the aquifer.

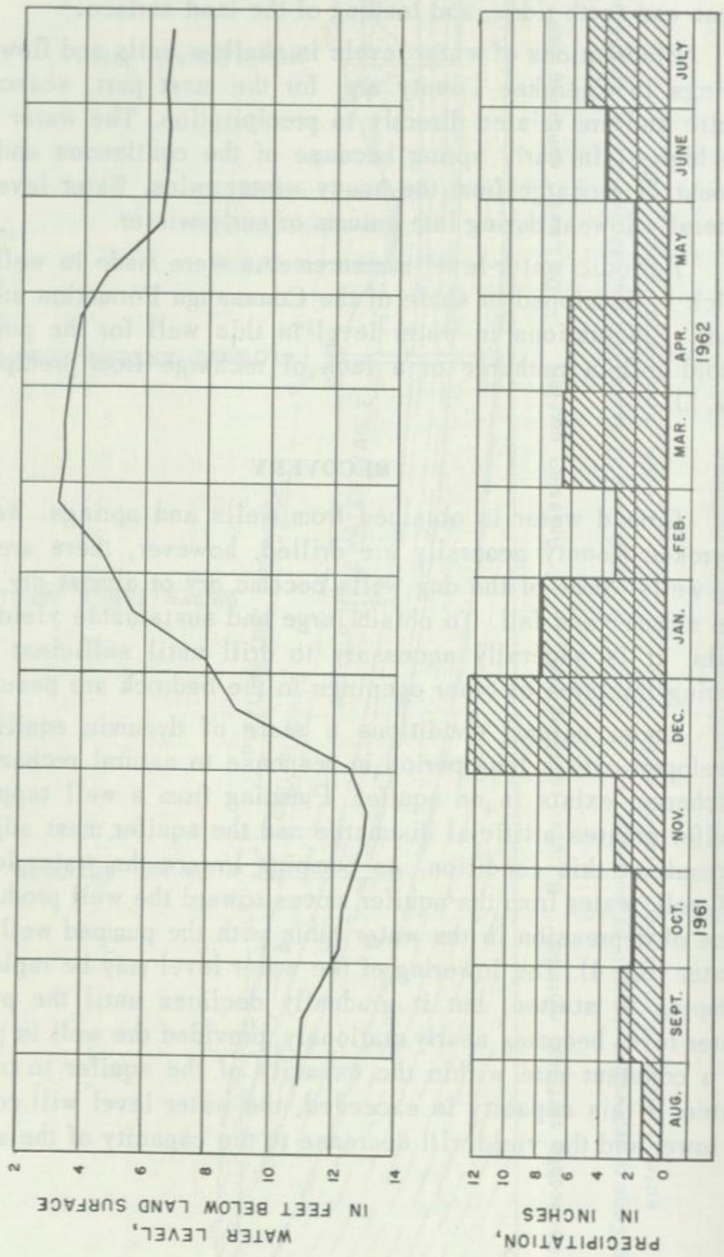


Figure 5.—Fluctuations in water level in well J-12 at Cedar Bluff, and precipitation at Leesburg.

DRILLED WELLS

An inventory of 190 drilled wells in Cherokee County has furnished a large part of the ground-water data in this report. The wells range from 5 to 10 inches in diameter but most are 6 inches in diameter. Depths of wells range from 17 to 1,025 feet but most are between 100 and 200 feet deep. Most of the wells are cased through the soil zone and the casing is seated in bedrock. The lower parts of the wells are left open. Some wells developed in fractures or in sand and gravel are cased completely except for screen or perforated casing placed opposite the producing zones. Wells O-10, O-11, O-18, and O-19 at Weiss Dam near Leesburg contain perforated casing opposite beds of sand and sandy clay. These wells were also gravel packed—a method of surrounding the well screen or perforated casing with gravel. Sample logs of drilled wells J-12, J-13, and W-11 are given in table 5 and drillers' logs of 7 wells are given in table 6.

Drilled wells in the county generally range in yield from 1 to 100 gpm (gallons per minute).

DUG WELLS

Dug wells in Cherokee County range from 18 to 60 inches in diameter and from 12 to 60 feet in depth. These wells supply a large part of the ground water used for domestic and stock supplies in rural parts of the county. Many dug wells fail to supply sufficient water during prolonged droughts and to obtain an adequate water supply, many have been deepened or replaced by drilled wells during the past 10 to 15 years. Dug wells generally are excavated in unconsolidated deposits and may or may not be lined, depending on the character of the material penetrated. Unlined wells tend to cave and are more subject to pollution from surface seepage. Data for 58 dug wells were collected during the investigation (table 4).

SPRINGS

Springs are abundant north and south of the Coosa Valley and are a potential source of water for industrial development. Twenty-one selected springs with measured or estimated discharges ranging from 20 to 3,300 gpm were inventoried during the investigation.

FORMATIONS AND THEIR WATER-BEARING PROPERTIES

A generalized section of the geologic formations in Cherokee County and their water-bearing properties is given in table 1. The water-bearing properties of rocks underlying various parts of the county are given on plate 1.

CAMBRIAN SYSTEM

WEISNER FORMATION

The Weisner Formation, named for Weisner Mountain in Cherokee County, is of Early Cambrian age and is the oldest formation that crops out in the county. Owing to its hardness and resistance to erosion, it forms prominent ridges and knobs in the southern part of the county. The Weisner consists of more than 5,500 feet (Hayes, 1902, columnar section, sheet 2) of grayish-orange and light-tan hard vitreous quartzite, sandstone, conglomerate, and sandy shale. The coarser rocks constitute a series of lenses, variable in extent and thickness, which are interbedded with the finer grained rocks. The quartzite beds are conspicuous; however, the finer grained rocks compose the bulk of the formation. The thickness of the Weisner has not been accurately determined owing to faulting and inadequate exposure. Sandstone or quartzite formerly was quarried from the formation in the vicinity of Rock Run and was used to manufacture silica bricks.

Obtaining ground water from the Weisner depends chiefly on the presence of fractures that, in most places, yield sufficient water of good quality to wells and springs for domestic supplies. Springs V-1, V-9, and V-10 flow from fractures or other openings and have discharges of 50, 50, and 40 gpm, respectively. Water from the Weisner Formation, based on 4 analyses (table 3), ranges in hardness from 6 to 24 ppm (parts per million).

SHADY DOLOMITE

The Shady Dolomite of Early Cambrian age overlies the Weisner Formation and crops out in several narrow bands in the southern part of Cherokee County. The Shady is probably composed of 800 to 1,200 feet (Hayes, 1902, p. 2) of yellowish-gray to light bluish-gray fine-grained medium- to thick-bedded limestone and dolomite.

Table 1.—*Generalized section of the geologic formations in Cherokee County, Ala., and their water-bearing properties*

System	Stratigraphic Unit	Thickness (feet)	Rock Character	Water-bearing Properties
Quaternary	Alluvium	0-30±	Sand, gravel, and clay underlies parts of the Coosa Valley.	Yields small quantities of soft water for domestic supplies. Will probably yield moderate to large supplies where aquifers are of sufficient thickness.
Pennsylvanian	Pottsville Formation	300-400	Sandstone, tan and gray; sandy shale; thin coal beds; and conglomerate.	Yields water to wells that are generally less than 100 feet deep. Water levels generally are a few feet below land surface. Wells yield as much as 30 gpm of soft water. The water generally contains excessive iron.
Mississippian	Pennington Formation and Bangor Limestone	250-300±	Pennington Formation consists of gray shaly and cherty limestone and red shale. Bangor Limestone consists of dark bluish-gray crystalline oolitic limestone.	Not known to yield water to wells or springs; however, wells penetrating openings in the Bangor probably would yield small to moderate quantities of water.
	Floyd Shale	1,000 ?	Shale, brown, dark-gray, and dull-green, friable; gray to brown fine-grained sandstone; layers of gray limestone in the lower part of the formation in places.	Yields adequate quantities of water for domestic supplies and, in places, as much as 35 gpm. The water generally is hard and contains excessive iron.
	Hartselle Sandstone, *Gasper Formation, and Ste. Genevieve Limestone	?	Hartselle Sandstone consists of light-gray and tan friable to well-cemented sandstone. The Gasper Formation consists of light-gray limestone and shale. The Ste. Genevieve Limestone consists of light- to dark-gray oolitic limestone interbedded with shale.	Formations are not known to yield water to wells or springs in Cherokee County; however, wells that penetrate openings in the limestone probably would yield water adequate for domestic supplies.
	Tuscumbia Limestone	10-15	Limestone and chert, gray.	Yields adequate quantities of moderately hard water for domestic supplies and springs discharge as much as 1,550 gpm from solutionally enlarged openings.
	Fort Payne Chert	100-200	Limestone, light-gray or white, siliceous; and nodules of fossiliferous chert.	
	Maury Formation	7-8	Shale and claystone, green, red, and gray, glauconitic, pyritiferous; contains phosphate nodules.	Relatively impermeable and does not yield water to wells.
Devonian	Chattanooga Shale	20-41	Shale, gray to black, carbonaceous, pyritiferous.	Relatively impermeable and does not yield water to wells.
	Frog Mountain Sandstone	800-1,200	Sandstone, gray to tan, coarse-grained, thick-bedded to massive, friable.	Formation is not known to yield water to wells or springs in Cherokee County.
Silurian	Red Mountain Formation	400-600	Shale, green, gray, and tan, and light-green or gray sandstone in the upper part; red, green, and brown shale and ferruginous sandstone in the lower part.	Yields adequate quantities of water for domestic and stock supplies. The water is soft but generally contains excessive iron.
Ordovician	Chickamauga Limestone	700-1,500	Limestone, bluish-gray to dark-gray in the upper part; red shale, red sandstone, and gray limestone in the lower part.	Yields adequate quantities of hard water for domestic and stock supplies.
	Newala Limestone	400 ?	Limestone, dark- to pearl-gray; and minor amounts of dolomite.	Not known to yield water to wells or springs in Cherokee County. Wells that penetrate openings in the limestone probably would yield small to moderate quantities of water.
Ordovician or Cambrian	Chepultepec Dolomite and Copper Ridge Dolomite	1,500-4,000	Dolomite, light- to dark-gray; weathers to a cherty clayey subsoil.	Source of water for many wells and springs. Wells yield as much as 50 gpm of moderately hard water and springs discharge as much as 3,300 gpm.
Cambrian	Conasauga Formation	1,000-1,500	Shale, light- to dark-gray, and dark-green, interbedded with limestone and dolomite.	Source of water for about one-third of the wells inventoried and 4 springs. Wells yield as much as 40 gpm of hard water and springs discharge as much as 970 gpm. Wells developed in shale generally yield little water below a depth of 100 feet. Some wells go dry during droughts.
	Rome Formation	700-1,000	Shale, red and green; interbedded with red, green, and tan sandstone.	Not known to yield water to wells or springs in Cherokee County.
	Shady Dolomite	800-1,200	Limestone and dolomite, yellowish-gray to light bluish-gray.	Yields adequate quantities of good quality water for domestic supplies.
	Weisner Formation	5,500+	Quartzite, grayish-orange and light-tan, hard, vitreous; sandstone; conglomerate; and sandy shale.	Yields adequate quantities of soft water for domestic supplies and springs discharge as much as 50 gpm.

The outcrop is generally marked by a deep residual clay covered by a dark-red soil several feet thick. In these residual accumulations, deposits of limonite formed at many places have been extensively worked for iron ore. The locations of some of these deposits are shown on plates 1 and 2.

The Shady Dolomite has a small areal extent in the county and is a source of water for a few domestic supplies. The hardness of water from wells V-4 and V-8 is 40 and 76 ppm.

ROME FORMATION

The Rome Formation of Early Cambrian age overlies the Shady Dolomite and crops out in several narrow bands in the southern part of the county. It consists of 700 to 1,000 feet (Hayes, 1902, p. 2) of red and green shale interbedded with red, green, and tan thin- to medium-bedded sandstone. The formation is well exposed in a road cut along Alabama Highway 9 about 2 miles south of Ellisville. Wells and springs are not known to yield water from the Rome Formation in Cherokee County.

CONASAUGA FORMATION

The Conasauga Formation of Middle and Late Cambrian age overlies the Rome Formation and is composed of about 1,000 to 1,500 feet of light- to dark-gray and dark-green shale interbedded with thin layers of light- to dark-gray limestone and dolomite. In parts of the county, the limestone and dolomite become medium- to thick-bedded. The Conasauga crops out in the 10- to 12-mile wide Coosa Valley, which comprises more than the center third of the county. The Conasauga also crops out in several small areas that are north and south of the valley.

Wells tapping openings in the thicker beds of limestone and dolomite yield as much as 40 gpm of water from the Conasauga Formation. Yields from wells tapping fractures in the shale generally are less than 5 gpm. The wells tapping the shale generally do not obtain additional water below a depth of 100 feet. The Conasauga will not yield adequate quantities of water for some uses in parts of the Coosa Valley. In those areas, future supplies may be

available from springs and streams. Four springs known to flow from openings in the Conasauga range in discharge from 260 to 970 gpm. Water from the Conasauga Formation, based on 89 analyses (table 3), ranges in hardness from 58 to 2,290 ppm and has a median of 174 ppm.

CAMBRIAN OR ORDOVICIAN SYSTEM

CAMBRIAN OR ORDOVICIAN DOLOMITES UNDIFFERENTIATED

The Cambrian or Ordovician dolomites in Cherokee County are composed of the Copper Ridge Dolomite of Cambrian age and the Chepultepec Dolomite of Early Ordovician age. They crop out in several northeastward-trending bands in the northern part of the county and in several irregular patterns in the southeastern part (pl. 2). The Copper Ridge and Chepultepec consist of about 1,500 to 4,000 feet (Hayes, 1902, columnar section, sheet 1) of light- to dark-gray medium- to thick-bedded dolomite, which weathers to a cherty clayey subsoil. An abundance of chert along the land surface, which has developed during the process of weathering, generally marks the area of outcrop.

The water-bearing properties and lithologies of the Copper Ridge and Chepultepec Dolomites are similar and are not differentiated in this report. Openings in the dolomites supply water to 10 of 21 springs and many of the wells inventoried. Nine of the springs range in discharge from 250 to 3,300 gpm. Five wells tapping the dolomites were reported to yield 7 to 50 gpm, however, large quantities of water probably could be developed from properly constructed wells that penetrate water-bearing fractures, solution cavities, and other openings within the dolomites. Water from the Cambrian or Ordovician dolomites, based on 57 analyses (table 3), ranges in hardness from 6 to 188 ppm and has a median of 94 ppm.

ORDOVICIAN SYSTEM

NEWALA LIMESTONE

The Longview and Newala Limestones of Early Ordovician age generally overlie the Cambrian or Ordovician dolomites in other parts of northern Alabama. However, the Longview is probably not

present in Cherokee County. The Newala crops out in three small areas in the southeastern part of the county (pl. 2). It consists of an estimated 400 feet or less of relatively pure dark- to pearl-gray thick-bedded limestone with minor amounts of dolomite.

The Newala Limestone is not known to yield water to wells or springs in Cherokee County. Fractures and solution openings, where present below the water table in the limestone, probably would yield small to moderate quantities of water.

CHICKAMAUGA LIMESTONE

The Chickamauga Limestone of Ordovician age crops out north of the Gadsden Fault (pl. 2) in several northeastward-trending bands. It consists of about 700 to 1,500 feet of bluish-gray to dark-gray fine-grained thick-bedded limestone in the upper part of the formation and red shale, red coarse-grained sandstone, and thin layers of gray limestone in the lower part.

The Chickamauga generally yields adequate quantities of water for domestic and stock use. The yield from well C-3 was reported to be 17 gpm in 1939. Larger yields probably could be obtained from wells that penetrate fractures, solution cavities, and other openings below the water table in the limestone. Water from the Chickamauga Limestone, based on 12 analyses (table 3), ranges in hardness from 10 to 478 ppm and has a median of 166 ppm.

SILURIAN SYSTEM

RED MOUNTAIN FORMATION

The Red Mountain Formation of Silurian age overlies the Chickamauga Limestone and crops out in Cherokee County in five areas north of the Gadsden Fault (pl. 2). The Red Mountain varies considerably in lithology. It generally is composed of 400 to 600 feet of red, green, and brown shale and ferruginous sandstone in the lower part of the formation, and green, gray, and tan shale and light-green or gray thick-bedded fine-grained sandstone in the upper part. The steeply tilted beds of the Red Mountain Formation and those of the closely associated Fort Payne Chert form long straight ridges in the area of outcrop.

Wells developed in the Red Mountain yield sufficient water for domestic and stock use; however, the water generally has a high iron content. The water, based on 10 analyses (table 3), ranges in hardness from 16 to 112 ppm and has a median of 33 ppm.

DEVONIAN SYSTEM

FROG MOUNTAIN SANDSTONE

The Frog Mountain Sandstone, named for Frog Mountain in Cherokee County, crops out in three areas in the southeastern part of the county (pl. 2). It is of Devonian age and consists of about 800 to 1,200 feet of gray to tan coarse-grained thick-bedded to massive friable sandstone. The Frog Mountain is not known to yield water to wells or springs in Cherokee County; however, fractures, where present, probably would yield adequate supplies for domestic use.

CHATTANOOGA SHALE

The Chattanooga Shale of Late Devonian age unconformably overlies the Red Mountain Formation in some of the ridges north of the Gadsden Fault (pl. 2) and is absent in the rest of the county. It consists of about 20 to 41 feet of gray to black carbonaceous pyritiferous marine shale that is sparsely fossiliferous. The shale thickens northward in Cherokee County. The Chattanooga Shale is relatively impermeable and does not yield water to wells.

MISSISSIPPIAN SYSTEM

MAURY FORMATION

The Maury Formation was formerly considered to be a part of the Chattanooga Shale of Devonian age; however, it is considered now to be Early Mississippian (Hass, 1956, p. 23). It unconformably overlies the Frog Mountain Sandstone south of the Gadsden Fault and conformably overlies the Chattanooga Shale in the rest of the county. The Maury consists of 7 to 8 feet of green, red, and gray glauconitic pyritiferous shale and claystone with phosphate nodules. The Maury Formation is relatively impermeable and does not yield water to wells.

FORT PAYNE CHERT AND TUSCUMBIA LIMESTONE

The Fort Payne Chert and Tuscumbia Limestone of Mississippian age have been combined in this report. The water-bearing properties of the two formations are similar and the outcrop of the Tuscumbia, where present, is too narrow to show separately on the geologic map (pl. 2). The Fort Payne crops out in five narrow bands—four in the northern part of the county and one in the south-central part. It overlies the Maury and is composed of about 100 to 200 feet of light-gray or white thin- to medium-bedded siliceous limestone containing nodules of light- to dark-gray chert. The formation weathers to a fossiliferous cherty rubble containing abundant crinoid stems. The cherty rubble is often stained black. The highly fossiliferous chert is readily distinguished from the sparsely fossiliferous cherts of the underlying Cambrian or Ordovician dolomites. The Tuscumbia Limestone overlies the Fort Payne Chert and is composed of about 10 to 15 feet of gray limestone and chert. It is not present south of the Gadsden Fault in Cherokee County.

Water in the Fort Payne and Tuscumbia occurs in openings along joints, fractures, and bedding planes. Wells that tap these openings yield water adequate for domestic supplies, and springs discharge as much as 1,700 gpm. Springs A-3, F-13, G-9, and O-3, which have discharges of 20, 20, 1,700, and 250 gpm, respectively, flow from openings in these formations. Water in the Fort Payne and Tuscumbia, based on 8 analyses (table 3), ranges in hardness from 58 to 150 ppm and has a median of 118 ppm.

STE. GENEVIEVE LIMESTONE, GASPER FORMATION, AND HARTSELLE SANDSTONE

The Ste. Genevieve Limestone, Gasper Formation, and Hartselle Sandstone of Mississippian age are combined in this report and are shown as a single unit on the geologic map (pl. 2). These formations are present only in the northwestern part of the county. Except for a small area where their absence is due to faulting, they crop out in a narrow northeastward-trending band. The Ste. Genevieve overlies the Tuscumbia and consists of light- to dark-gray thin- to medium-bedded oolitic limestone interbedded with

shale. The limestone weathers to gray chert in places. The Gasper overlies the Ste. Genevieve and consists of light-gray medium-bedded limestone; light-gray compact lithographic limestone; and shale. The Hartselle overlies the Gasper and consists of light-gray and tan friable to well-cemented sandstone. Weathered exposures show a dominantly tan color, but in detail may show zones and patches colored by brown iron oxide. These formations are not known to yield water to wells or springs in Cherokee County.

FLOYD SHALE

The Floyd Shale of Mississippian age crops out in two small areas in the east-central part of the county and in a narrow band in the south-central part (pl. 2). In places, the formation probably is composed of as much as 1,000 feet of brown, dark-gray, and dull-green friable shale; gray to brown fine-grained sandstone; and layers of gray limestone which are interbedded in the lower part of the formation.

Wells tapping the Floyd Shale yield sufficient quantities of water for domestic supplies. Well K-3 had a reported yield of 6 gpm in 1961 and well X-6 a reported yield of 35 gpm in 1958. The water, based on 7 analyses (table 3), ranges in hardness from 24 to 196 ppm and has a median of 125 ppm.

BANGOR LIMESTONE AND PENNINGTON FORMATION

The Bangor Limestone and Pennington Formation of Mississippian age crop out along the southeast flank of Lookout Mountain. The Bangor consists of an estimated 200 to 300 feet of dark bluish-gray thick-bedded crystalline and oolitic limestone. It is overlain by the Pennington, which is composed of about 50 feet of gray shaly and cherty limestone, and red shale. The Bangor and Pennington are undifferentiated on the geologic map (pl. 2). The formations are not known to yield water to wells or springs in Cherokee County; however, openings in limestone in the Bangor probably would yield small to moderate supplies.

PENNSYLVANIAN SYSTEM

POTTSVILLE FORMATION

The Pottsville Formation of Pennsylvanian age overlies the Pennington Formation and caps Lookout Mountain. The formation consists of an estimated 300 to 400 feet of tan and gray thin- to thick-bedded well-cemented sandstone, tan and dark-gray sandy shale, thin coal beds, and conglomerate. The conglomerate generally is composed of coarse sand grains with numerous well-rounded small quartz pebbles. Because of the resistant character of the rocks, the area underlain by the Pottsville is higher in altitude than adjacent areas and is bounded by a steep escarpment. The subsoil generally is less than 10 feet thick throughout the outcrop area.

Most wells tapping the Pottsville Formation are 6 inches in diameter and less than 100 feet deep. Water levels generally are a few feet below the land surface and buckets are often used to lift the water. Wells developed in the Pottsville generally range in yield from 1 to 30 gpm. The water is used for domestic and stock supplies. Ground water from the Pottsville generally contains an excessive amount of iron. The water, based on 35 analyses (table 3), ranges in hardness from 8 to 80 ppm and has a median of 24 ppm.

QUATERNARY SYSTEM

ALLUVIUM

Alluvial deposits of Recent age, consisting chiefly of sand, gravel, and clay, overlie the Conasauga Formation in places in the Coosa River valley. Available data indicate that the thickness of the alluvium, where present, is less than 30 feet in most areas. Most of the deposits were inundated by backwaters of the Weiss Reservoir in 1961. The alluvial deposits were not mapped separately from other geologic units (pl. 2) because of their limited extent and because of their similarity to weathered residual deposits formed on adjacent formations.

Wells tapping beds of sand and gravel supply small quantities of water for domestic use and would probably yield moderate to

large quantities where the aquifers are of sufficient thickness. Reported yields of 25 to 100 gpm were obtained from wells O-10, O-11, O-18, and O-19 at Weiss Dam near Leesburg in 1961. Water from the alluvium, based on 29 analyses (table 3), ranges in hardness from 8 to 192 ppm and has a median of 28 ppm.

QUALITY OF WATER

All natural waters contain dissolved minerals. Precipitation, even before it reaches the ground, dissolves gases and minor quantities of mineral matter from the atmosphere. After reaching the ground, it continues to dissolve minerals and undergoes various chemical reactions, which may or may not effect its potability. The amount and kind of minerals dissolved in ground water may vary greatly from place to place depending primarily on the types of minerals in the soils and rocks over or through which the water moves, the presence of carbon dioxide in the water, the temperature of the water, and the length of time the water has been in contact with the minerals. The most common mineral constituents in ground water are silica, iron, manganese, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, fluoride, and nitrate (table 2).

The quality limits of water for a particular purpose are not easily defined. However, water for municipal and domestic supplies should, insofar as possible, conform to the standards of the U.S. Public Health Service (1962) for interstate carriers. These standards are included in the following discussion, which is not inclusive but summarizes briefly chemical properties and mineral constituents of ground water that should be considered in developing a supply for drinking water.

Iron and manganese.—Iron and manganese in water, even in small quantities, are objectionable because they stain plumbing fixtures and laundry yellowish-brown to reddish-brown or black. A concentration of more than 0.3 ppm iron or 0.05 ppm manganese is considered excessive in drinking water or public water supplies.

Sulfate.—Sulfate content should not exceed 250 ppm. Salts of sulfate are a laxative and a quantity equal to that in 1 liter of water containing 1,000 to 2,000 ppm sulfate constitutes an average

dose (Rainwater and Thatcher, 1960, p. 279).

Chloride.—Chloride in large concentrations makes the water undesirable for many uses. Chloride content should not exceed 250 ppm.

Fluoride.—Fluoride is a minor constituent of ground water, however, excessive quantities in drinking water during calcification may cause mottling of children's teeth. Supplies should not contain more than 0.8 to 1.7 ppm of fluoride depending on the annual average of maximum daily air temperatures. Rainwater and Thatcher (1960, p. 163) stated, "Available evidence indicates that water containing less than 1.0-0.9 ppm of fluoride seldom causes mottling of children's teeth, and the literature describing the beneficial effect of 0.88-1.5 ppm in drinking water as an aid in the reduction of tooth decay in children is abundant."

Nitrate.—Nitrate in water has considerable significance as an indication of pollution and it may be a contributing factor to a condition in babies known as methemoglobinemia (Maxcy, 1950, p. 265). Nitrate content should not exceed 45 ppm.

Hardness.—Hardness is a property of water attributable chiefly to alkaline earths, principally calcium and magnesium. Hardness is an indicator of the soap-consuming capacity of the water and, indirectly, an indicator of the scale-forming tendency of the water when used in boilers. Hardness of water is classified by the U.S. Geological Survey as: less than 61 ppm, soft; 61 to 120 ppm, moderately hard; 121 to 180 ppm, hard; and in excess of 180 ppm, very hard.

Specific conductance and dissolved solids.—Specific conductance is a measure of the ability of a solution to conduct an electric current, and is a general indicator of the amount of minerals dissolved in a water. The following general relation is applicable: specific conductance x (0.65 ± 0.05) = ppm dissolved solids. Dissolved solids should not exceed 500 ppm.

pH.—The pH of a water is a number that is the negative logarithm of the hydrogen-ion concentration in moles per liter of solution and, thus, is a measure of the water's acidity or alkalinity. Theoretically a neutral water has a pH of 7.0. Progressive values on the pH scale below 7.0 denote increasing acidity and progressive

values above 7.0 denote increasing alkalinity.

The hardness and chloride concentrations in water were determined by field methods for 243 samples from wells and springs inventoried in Cherokee County (table 4). A more comprehensive chemical analysis was made of water from 11 selected wells and springs by the U.S. Geological Survey, Quality of Water Branch Laboratory at Baton Rouge, La. (table 2).

Field analyses are only approximations, however, they are useful in a general comparison of hardness and chloride content of water from different geologic formations as shown in table 3. Any apparent discrepancies in values of hardness and chloride between table 2 and table 4 are due in part to seasonal changes in the quality of the water caused by changes in ground-water recharge and differences in laboratory and field techniques.

The information obtained from the chemical analyses indicates:

1. The quality of ground water from the principal aquifers in Cherokee County is suitable for many uses; however, the reported high iron content of water from the Red Mountain and Pottsville Formations and the hardness of water from some of the aquifers, chiefly the Conasauga Formation and Chickamauga Limestone, would require treatment for some uses.

2. The iron content of water from 11 wells and springs ranges from 0.03 to 5.6 ppm (table 2). Well H-10 has an iron content of 5.6 ppm and is developed in sandstone and shale of the Pottsville Formation. Most families that obtain water supplies from the Red Mountain and Pottsville Formations report excessive iron in the water.

3. The chloride concentration of water from wells and springs ranges from a trace to 152 ppm (tables 2 and 4). However, concentrations of chloride are generally less than 50 ppm. The median chloride content of water from each of the aquifers is 12 ppm or less (table 3).

4. The fluoride concentration of water from 10 of 11 wells and springs sampled is low. However, water from well J-5 has a fluoride concentration of 1.6 ppm (table 2).

5. The hardness of water from wells and springs sampled ranges from 6 ppm in water from a few wells in the Weisner Formation and the Cambrian or Ordovician dolomites undifferentiated to 2,290 ppm in water from well W-6 in the Conasauga Formation (tables 2 and 4). The median hardness of water from the aquifers ranges from 9 ppm in the Weisner Formation to 174 ppm in the Conasauga Formation (table 3).

6. Concentrations of sulfate, nitrate, and dissolved solids (calculated from specific conductance) determined are within the recommended limits of the U.S. Public Health Service.

7. Ground water in Cherokee County has a wide range of temperatures. The median temperature determined from the data in tables 2 and 4 is 60° F.

Table 2.—*Chemical analyses of water from wells and springs in Cherokee County, Ala.*

Well or spring: Numbers correspond with those in plate 1 and table 4.

Water-bearing unit: OCu, Cambrian or Ordovician dolomites undifferentiated; Srm, Red Mountain Formation; Mtm, Maury Formation, Fort Payne Chert, and Tuscumbia Limestone; Mf, Floyd Shale; IPpv, Pottsville Formation.

Well or spring	Date of collection	Water-bearing unit	Temperature (°F)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25° C)	pH
				Parts per million										Calcium, magnesium	Noncarbonate		
C-2	1-24-62	Srm ?	59	0.29	27	2.4	2.8	100	0	0.4	1.1	0.1	0.1	77	0	167	7.4
D-4	1-24-62	OCu	59	.36	30	6.9	1.6	124	0	.4	2.0	.0	2.8	103	1	201	7.7
F-16	1-24-62	OCu	59	.05	26	8.1	2.3	120	0	.0	2.1	.1	1.8	98	0	190	...
F-22	1-24-62	OCu	59	.03	27	9.4	1.4	136	0	.0	.9	.0	1.9	106	0	207	7.8
G-9	1-24-62	Mtm	59	.04	42	1.8	3.2	140	0	3.8	1.1	.0	.4	112	0	226	7.7
H-10	1-24-62	IPpv	...	5.6	16	2.5	6.9	77	0	.0	1.8	.1	.7	50	0	127	7.5
I-3	1-24-62	IPpv	...	.16	21	3.1	31	163	0	.4	.8	.1	.2	65	0	246	7.8
J-5	1-24-62	Mf	...	.05	21	18	39	233	0	8.2	7.2	1.6	.2	125	0	379	8.0
O-3	1-24-62	Mtm	61	.04	36	1.5	3.7	124	0	.6	1.1	.1	.5	96	0	201	7.8
W-1	1-24-62	OCu	60	.04	26	10	3.7	136	0	.6	.9	.1	.6	106	0	207	7.9
W-5	1-24-62	OCu	...	.20	30	15	2.5	157	0	.6	6.0	.1	2.8	135	6	268	7.9

Table 3.—*Hardness and chloride concentrations in water from wells and springs in Cherokee County, Ala.*[1]

Water-bearing unit	Number of analyses	Hardness as $CaCO_3$ parts per million			Chloride (Cl) parts per million		
		min	max	median	min	max	median
Alluvium	29	8	192	28	2	28	7
Pottsville Formation	35	8	80	24	Trace	138	4
Floyd Shale	7	24	196	125	2	25	7
Tuscumbia Limestone and Fort Payne Chert	8	58	150	118	1.1	25	2
Red Mountain Formation	10	16	112	33	1.1	57	9
Chickamauga Limestone	12	10	478	166	2	117	5
Ordovician or Cambrian dolomites undifferentiated	57	6	188	94	9	39	4
Conasauga Formation	89	58	2,290	174	Trace	152	7
Shady Dolomite	2	40	76	58	11	14	12
Weisner Formation	4	6	24	9	2	4	2

[1] Based on results of analyses in tables 2 and 4.

SUMMARY

Rocks in Cherokee County have been sharply folded into northeastward-trending synclines and anticlines complicated by thrust faults. These structures are typical of the Valley and Ridge province of the southern Appalachian Mountains. The county is underlain by consolidated rocks consisting of shale, sandstone, limestone, dolomite, chert, quartzite, conglomerate, claystone, and coal, which range in age from Early Cambrian to Pennsylvanian. Unconsolidated deposits of sand, gravel, and clay of Recent age overlie the Conasauga Formation in parts of the Coosa Valley.

Ground-water supplies are obtained chiefly from the Conasauga Formation, the Cambrian or Ordovician dolomites undifferentiated, and the Pottsville Formation. Based on data obtained from the investigation, wells yield as much as 40 gpm of water from the Conasauga Formation; 7 to 50 gpm from the Cambrian or Ordovician dolomites; 6 to 35 gpm from the Floyd Shale; and as much as 30 gpm from the Pottsville Formation. Springs discharge as much as 50 gpm of water from the Weisner Formation; 260 to 970 gpm from the Conasauga Formation; 250 to 3,300 gpm from the Cambrian or Ordovician dolomites; and 20 to 1,700 gpm from the Tuscumbia Limestone and Fort Payne Chert undifferentiated. Nearly all the springs are in the northern and southeastern parts of the county and many discharge water of good quality in quantities adequate for future industrial development.

Ground water is used primarily for domestic, stock, and school supplies in rural parts of the county. The larger towns in Cherokee County are in the Coosa Valley, which is underlain by shale of the Conasauga Formation. Wells developed in the shale generally fail to furnish adequate quantities of water for municipal and industrial supplies. Therefore, the towns of Centre and Cedar Bluff obtain their water supplies from streams. Cedar Bluff formerly obtained its water supply from drilled wells; however, the supply became inadequate because of increased demands on the system concurrent with several years of drought.

The chemical quality of ground water generally is good except for the hardness of water from some wells developed in the Conasauga Formation and Chickamauga Limestone, and the excessive

iron content of water from the Red Mountain and Pottsville Formations. The median temperature of ground water from wells and springs in Cherokee County is about 60° F.

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BASIC DATA

Table 4.—*Records of wells and springs in Cherokee County, Ala.*

Well or spring: Numbers correspond to those in plate 1 and table 2; asterisk indicates chemical analyses given in table 2.

Type: D, drilled; Du, dug; S, spring.

Depth of well and water level: Depths shown in feet are reported; those shown in feet and tenths are measured.

Altitude: Altitudes determined by aneroid barometer.

Method of lift: F, flows; J, jet; M, manual; N, none; P, piston; S, submergible; T, turbine.

Use: D, domestic; Ind, industrial; Irr, irrigation; N, not used; P, public supply; S, stock.

Water-bearing unit: Cw, Weisner Formation; Cs, Shady Dolomite; Cc, Conasauga Formation; OCu, Cambrian or Ordovician dolomites undifferentiated; Oc, Chickamauga Limestone; Srm, Red Mountain Formation; Mtm, Maury Formation, Fort Payne Chert, and Tuscumbia Limestone; Mf, Floyd Shale; IPpv, Pottsville Formation; Qal, Alluvium.

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
A-1	Looney Galloway	.....	D	107.1	6	IPpv	1,559	24.6	8-30-61	M	D	59	7	18	Supplies 2 families.
A-2	Albert Deering	-- O'Dell	D	47	6	IPpv	1,521	19.1	8-30-61	M	D	59	2	10	Cased to 4 ft.
A-3	Luther D. Willingham	.....	S	.....	...	Mtm (?)	751	.....	.....	F	N	..	...	.....	Estimated flow, 20 gpm on 8-30-61.

B-1	L. D. Powell	-- O'Dell	D	96	8-6	IPpv	1,528	33.7	8-30-61	M	D	59	99	32	8-in. terra-cotta casing to 3 ft., 6-in. open hole below. Inadequate during dry season. Coal seam at about 60 ft.
C-1	Melvin Bentley		Du	42.4	36	Srm (?)	810	33.3	9- 6-61	J	D	..	11	24	Not cased.
*C-2	Robert Jennings	Michel Houston	D	45	6	Srm (?)	807	.0	8-25-61	J	D	59	4	112	Cased to 45 ft. Flow estimated with pump off, 1 gpm on 8-25-61.
C-3	James Bankson	Cherokee Well Drillers.	D	97	6	Oc	948	27.0	9- 6-61	J	D	..	2	134	Cased to about 30 ft. Yield reported, 17 gpm in 1939.
C-4	B. J. Dodd	Winston William	D	150	6	O€u	766	58.5	9- 5-61	J	D	..	2	158	Cased to 85 ft.
C-5	James A. Gardner	Michel Houston	D	154	6	O€u	776	111.1	9- 5-61	J	D	..	2	54	Cased to 145 ft.
C-6	Rex Maples		Du	50.4	30	O€u	811	43.2	9- 5-61	J	D	..	14	32	
C-7	Auburn Canada	-- O'Dell	D	80	6	Srm	823	35.2	8-30-61	J	D	..	11	60	Cased to 5 ft. Supplies 2 families. Water contains excessive iron.
C-8	Mrs. Nora Kennedy		Du	40.1	30	Srm	823	27.5	8-30-61	M	D	60	28	38	Lined with rock to 40 ft. Inadequate during dry season.
C-9	Jimmy Epps		Du	58.2	36	O€u	737	46.6	9- 5-61	M	D	59	5	90	Not cased.
D-1	Millard Bridges	Michel Houston	D	100	6	Oc (?)	782	40.7	9-11-61	J	D	..	4	76	Cased to 42 ft. Bedrock at 41 ft.
D-2	Della Cavin		D	52	6	Srm	760	21.8	9- 6-61	J	D	..	7	100	
D-3	G. O. Crowe		Du	31.2	24	€c	731	25.2	8-23-61	P	D	..	7	140	Terra-cotta casing to 30 ft. Supplies 4 families.
*D-4	Jim Berry		S	.....	...	O€u	693	.....	.....	F	D	59	4	138	Berry Spring. Supplies 2 families. Measured flow, 3,300 gpm on 2-14-62.
D-5	J. J. Sentell		Du	31.9	36	O€u	720	26.4	9-11-61	J	D	..	11	26	
D-6	Archie H. Parker		Du	16.6	30	O€u	685	11.3	8-30-61	M	D	66	5	32	
D-7	J. T. Hughes, Jr		S	.....	...	O€u	662	.....	.....	F	N	..	...	.....	Estimated flow, 25 gpm on 2-14-62.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
D-8	Dewey Tallent.....	Michel Houston..	D	167	6	O€u	783	140.7	9- 5-61	J	D	..	4	94	Cased to 135 ft.
D-9	Ben Humphrey.....	.....	Du	49.2	36	Oc	709	46.3	9- 5-61	M	D	58	2	10	Not cased.
D-10	A. H. Moseley.....	Rogers Well Drillers.	D	100	6	Oc	675	25.0	8-23-61	J	D	..	4	152	Cased to 21 ft. Supplies 2 families.
E-1	Billy Ray.....	Hawthorne Well Drillers.	D	96	6	O€u	702	56.0	8-25-61	J	D	..	2	12	Cased to 94 ft. Yield reported, 8 gpm in September 1960.
E-2	John M. Doherty....	Virgil Mitchell...	D	69	6	O€u	691	49.3	8-25-61	J	D,S	..	39	182	Cased to 64 ft. Supplies 1 family and 35 head of stock. Yield reported, 7 gpm in 1954.
E-3	Ray Cecil Burkhalter	Rogers Well Drillers.	D	66	6	O€u	695	33.6	8-23-61	J	D,P	..	4	90	Cased to 51 ft. Supplies 2 families and store. See driller's log in table 6.
E-4	C. E. Chesnut.....	.....	Du	25.8	30	O€u	599	16.6	9-12-61	M	D	61	28	50	Not cased.
E-5	...do.....	.....	Du	42.7	30	O€u	606	24.1	9-13-61	M	D	60	32	82	Rock curbing.
E-6	Robert Bell	.....	D	150.5	6	Mf (?)	646	37.8	9-12-61	J	D,S	..	2	196	Supplies 1 family and 20-30 head of stock.
E-7	Miss Buford Bell...	.....	Du	27.0	42	O€u	600	17.8	9-13-61	J	D	..	11	50	Not cased.

E-8	Dwight Henderson		D	100	6	OCu	634	76.7	9-13-61	J	D	..	4	162	Supplies 2 families.
F-1	H. R. Hughes, Jr.	-- O'Dell	D	102	....	OCu	708	72	8- -61	J	D	..	4	18	
F-2	Rinehart Junior High School.	Rogers Well Drillers.	D	328	6	OCu	812	128.9	8-25-61	P	P	..	2	180	Supplies 90 students and 5 teachers.
F-3	Alabama Power Co.		Du	36.8	36	Srm (?)	797	14.5	9- 6-61	M	D	60	11	20	Not cased.
F-4	...do.		D	318	6	Mtm	718	22.1	8-28-61	J	D	..	...	.....	Former supply for sawmill and 40 families.
F-5	Carl Lewis	Hawthorne Well Drillers.	D	57	6	Srm	701	12.7	8-28-61	N	N	..	...	.....	Cased to 9 ft. Water contains excessive iron.
F-6	...do.	...do.	D	83	6	Mtm	701	29.2	8-28-61	J	D	..	2	142	Cased to 71 ft.
F-7	J. C. Wilson	...do.	D	185	6	OCu	699	46.3	9-11-61	J	D	..	4	148	Cased to 60 ft.
F-8	Miss Viola Bannister.		Du	46.1	36	OCu	772	33.2	9-11-61	J	D	..	11	22	Not cased. Supplies 2 families.
F-9	Tom Burleson	Hancock and Chesnut.	D	173	6	OCu	758	121.7	9- 6-61	J	D	..	2	8	
F-10	Jerry G. Leath		Du	22.3	42	Oc	660	15.8	9- 5-61	J	D	..	50	478	Lined with rock to 22 ft.
F-11	Ralph Martin		S	.....	...	OCu	644	.....	.....	F	D	58	2	130	Measured flow, 2,100 gpm on 2-14-62.
F-12	Mrs. O. L. Tumlin	Rogers Well Drillers.	D	126	6	Mtm	768	55.5	9-15-61	J	D	..	4	96	
F-13	V. B. Taft		S	.....	....	Mtm	773	.....	.....	F	D	58	11	124	Taft Spring. Estimated flow, 20 gpm on 2-15-62.
F-14	Clarence Crane		Du	22.0	30	OCu	744	22.7	9-15-61	M	D	60	18	18	Not cased. Inadequate during dry season.
F-15	E. G. Slayton		Du	31.0	48	OCu	801	21.8	9-15-61	M	D	59	4	12	Not cased. Supplies 2 families. Dry during summer of 1954.
*F-16	T. A. Ray		S	.....	....	OCu	628	.....	.....	F	N	59	4	108	Waterloo Spring. Measured flow, 2,500 gpm on 2-14-62
F-17	S. E. Looney	Michel Houston	D	102	6	OCu	684	70.8	9- 6-61	J	D,P	..	4	100	Supplies 1 family and store.
F-18	Marie Laws	Rogers Well Drillers.	D	118.1	6	Oc	662	14.3	8-23-61	M	D	61	4	248	
F-19	Hugh Reed		D	85.8	6	Oc	640	32.3	9-11-61	M	D	61	7	146	

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
F.20	C. D. Sanford.....	.....	Du	37.4	30	O€u	650	23.7	9-15-61	M	D	60	2	50	Cased to 37 ft.
F-21	C. M. Thomas.....	Rogers Well Drillers.	D	150(?)	6	O€u	659	50.9	9-13-61	J	D	..	25	110	Water contains excessive iron.
*F-22	Milton Erwin	.....	S	.....	...	O€u	590	.....	.....	F	D	59	2	124	Erwin Spring. Measured flow, 800 gpm on 2-14-62.
F-23	Hoyt Hurley.....	.....	Du	25.5	30	Oc	661	21.0	9-11-61	M	D	59	117	450	Not cased.
F-24	W. D. Browder	Rogers Well Drillers.	D	72	6	Mf (?)	646	39.9	9-12-61	J	D	..	25	24	Water contains excessive iron.
G-1	Doyle Tidmore.....	.....	D	42.5	6	IPpv	1,205	29.9	9-25-61	M	D	62	7	16	Cased to 6 ft. Inadequate during dry season.
G-2	...do.....	Taylor Gozia	D	85	6	IPpv	1,205	25.2	9-25-61	N	N	..	...	.....	Cased to 4 ft. Water contains excessive iron.
G-3	J. M. and C. A. Daniel.	.....	Du	47.9	30	Mtm	679	30.6	9-15-61	M	D	59	25	58	Lined with rock.
G-4	Grady New	.....	D	26.9	6	IPpv	1,203	15.0	9-25-61	M	D	61	4	10	Water contains excessive iron.
G-5	Amanda Tucker and Ellie Teague.	Hawthorne and Hancock.	D	71.6	6	IPpv	1,131	34.0	9-25-61	N	N	..	...	.....	Do.
G-6	...do	...do.....	D	116	6	IPpv	1,131	41.5	9-25-61	N	N	..	...	.....	Do.
G-7	...do	.....	D	43	6	IPpv	1,120	17.9	9-25-61	J	D	..	4	8	6-in. terra-cotta casing to 5 ft.

G-8	...do		D	31.9	6	IPpv	1,110	21.1	9-25-61	P	S	62	2	14	6-in. terra-cotta casing to 4 ft. Supplies 2-3 head of stock. Measured yield, ¼ gpm for 1 hr. on 9-25-61.
*G-9			S			Mtm	597			F	N	59	2	150	Congo Spring. Measured flow, 1,700 gpm on 5-10-55 and 1,600 gpm on 2-14-62.
G-10	Charlie Hindmon	Michel Houston	D	127	6	OCu	720	78.3	9-15-61	M	D	60	2	10	Cased to 127 ft.
H-1	J. L. Manley		D	80	6	IPpv	996	27.5	10- 4-61	J	D		4	32	Supplies 2 families. Water contains excessive iron.
H-2	Andy Mitchell		D	44.7	6	IPpv	916	28.6	10- 4-61	M	D	61	4	64	
H-3	Paul Lawson	Hancock and Chesnut.	D	40	8-6	IPpv	1,050	12.0	9-26-61	M	D	65	4	14	8-in. terra-cotta casing to 5 ft., 6-in. open hole below.
H-4	J. E. Dantzler		D	40	6	IPpv	1,027	7.5	10- 6-61	J	D,P		2	24	Cased to 3 ft. Supplies 1 family and store. Water contains excessive iron. Installed water conditioner.
H-5	...do		D	38.4	6	IPpv	1,027	7.7	10- 6-61	N	N				Water contains excessive iron.
H-6	P. K. Brindley		D	31.9		IPpv	891	22.7	10- 4-61	M	D	61	7	14	Inadequate during dry season.
H-7	Dewey Brune		D	55.8	6	IPpv	869	17.2	10- 6-61	J	D,P		Trace	26	Supplies 1 family and service station. Water contains excessive iron.
H-8	R. H. Mackey	Hawthorne and Hancock.	D	127	6	IPpv	942	40.4	10- 4-61	J	D,S		4	80	Cased to 24 ft. Supplies 4 families and 55 head of stock.
H-9	G. H. Farmer	Dewey Yancy	D	39.7	6	IPpv	934	22.4	10- 6-61	J	D		4	38	Cased to 6 ft. Water contains excessive iron.
*H-10	Sandrock High School.	Rogers Well Drillers.	D	126	6	IPpv	928	28.3	9-26-61	J	P		2	58	Supplies 406 students and 16 teachers. Water contains excessive iron.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		[illegible]od of lift	[illegible] of water	Field determinations			Remarks
								[illegible]ve (+) or below surface (feet)	Date of [illegible]surement			[illegible]perature (°F)	[illegible]ride (Cl) (ppm)	[illegible]dness as $CaCO_3$ (ppm)	
H-11	R. H. Daniel.....	Hancock and Chesnut.	D	75.9	30-6	IPpv	979	15.9	9-28-61	J	D	..	4	34	30-in. dug well to 18 ft. and 6-in. open hole from 18 to 75.9 ft. Supplies 3 families.
H-12	W. G. Abernathy ...	.....	D	31	6	IPpv	870	9.6	10- 4-61	J	D	..	2	18	Cased to 20 ft. Water contains excessive iron. Installed water conditioner. Yield reported, 30 gpm in 1951.
H-13	H. A. Hood.....	.....	D	44.4	6	IPpv	864	29.0	9-26-61	M	D	61	138	54	
H-14	Dan Beck	.....	D	.....	6	IPpv	863	19.1	10- 6-61	J	D	..	4	38	Supplies 2 families. Water contains excessive iron.
H-15	H. L. Simpson	-- O'Dell.....	D	131	6	IPpv	974	35	8- -60	J	D	..	2	20	Cased to 35 ft. Water contains excessive iron.
H-16	T. A. Gladden	L. K. McElroy ...	D	56	6	IPpv	859	2.3	10-17-61	J	P	..	7	24	Supplies store and service station. Water contains excessive iron.
H-17	Joe Farley	Hawthorne Well Drillers.	D	38.1	6	IPpv	894	11.7	10- 6-61	P	D	..	4	54	
H-18	J. T. Kirby.....	.....	D	57.5	6	IPpv	891	22.5	10- 6-61	J	D	..	Trace	22	Water contains excessive iron.

H-19	Myrtle Chandler....	Dick Hood	D	74	6	Ppv	834	32.6	10-17-61	J	D	..	4	8	Cased to 2 ft. Supplies 2 families. Water contains excessive iron.
H-20	N. F. St. Clair.....	Rogers Well Drillers.	D	98.5	6	Ppv	859	37.1	9-28-61	N	N	..	...	.....	Cased to 2 ft.
H-21	...do.....	Hawthorne Well Drillers.	D	171	6	Ppv	859	4.9	10- 4-61	J	D	..	2	22	Cased to 10 ft. Water contains excessive iron. Yield reported, 1 gpm in 1959. Coal seam at about 100 ft.
H-22	C. L. St. Clair.....	...do	D	70	6	Oc	590	33.2	9-28-61	J	D	..	4	188	Supplies 2 families.
I-1	Mrs. J. C. Daniels..	Rogers Well Drillers.	D	47.1	6	Srm	586	15.8	8-28-61	M	D	62	4	18	
I-2	T. W. Hufsteler	.....	D	32.0	6	Ppv	950	18.5	9-26-61	J	D	..	4	12	Cased to 5 ft.
*I-3	Mrs. W. M. Hancock.	Hancock and Chesnut.	D	200	6	Ppv	967	6.9	9-26-61	J	D, Ind, S	..	2	76	Cased to 4 ft. Supplies 2 families, cotton gin, and 2 head of stock. Flows during wet season.
I-4	Melvin Tucker	.....	D	40.1	6	Ppv	939	18.3	9-26-61	M	D	62	32	70	Cased to 3 ft. Inadequate and muddy during dry season.
I-5	R. C. Wester.....	.....	D	19.7	6	Ppv	900	19.1	9-26-61	M	D	62	2	10	Cased to 4 ft.
I-6	Herman Edge	Hancock and Chesnut.	D	70	6	Ppv	854	28.5	9-26-61	J	D	..	7	20	Cased to about 6 ft.
I-7	Mrs. Eula Coffey...	.....	Du	33.9	48	Oc	595	29.5	9-25-61	M	D	60	39	180	Lined with rock to 33 ft.
I-8	Renfroe Daniel.....	.....	Du	29.1	24	Oc	581	21.0	9-25-61	J	D	..	25	82	24-in. terra-cotta casing to about 27 ft. Supplies 2 families.
I-9	Mrs. G. E. W. Smith.	Rogers Well Drillers.	D	63.9	6	Srm	602	25.2	9-25-61	M	D	61	4	28	Water contains excessive iron.
I-10	H. B. Starling	.....	Du	41.1	24	Srm (?)	624	30.7	9-25-61	J	D	..	57	16	Became dry summer of 1954.
I-11	Erskine Mitchell ...	.....	D	53.3	6	Ppv	827	14.5	10- 4-61	J	D	..	11	32	Water contains excessive iron.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
I-12	Curtis Pruitt		Du	17.0	36	IPpv	846	12.5	9-28-61	M	D	64	50	30	Not cased. Inadequate during dry season.
I-13	P. E. Owen		D	163.8	6	O€u	640	83.9	9-28-61	N	D	..	...	....	
I-14	Kenneth St. Clair	Hancock and Chesnut.	D	130	6	O€u	606	65.0	9-28-61	J	D	..	2	160	Supplies 2 families.
J-1	C. E. Chesnut		Du	32.3	24	Mf (?)	611	26.2	9-12-61	M	D	60	25	172	Lined with rock to 32 ft.
J-2	Georgia Renderers, Inc.		D	92.8	6	Oc	614	26.2	9-13-61	M	D	61	71	292	
J-3	Oliver Zuber	Hancock and Chesnut.	D	60	6	O€u	625	22.9	9-15-61	J	D,S	..	2	10	Cased to 60 ft. Supplies 1 family and 21 hogs.
J-4	R. L. Story		D	100.0	6	Oc	641	29.9	9-13-61	N	N	..	...	....	Abandoned quarry.
*J-5	Gaylesville High School.		D	356	6	Mf	616	.....	.....	T	P	..	4	120	Supplies 392 students and 15 teachers. Pump set at 300 ft.; can be pumped dry.
J-6	Gaylesville Oak Bowery Methodist Church.	Rogers Well Drillers.	D	.....	6	O€u	592	20.0	9-13-61	J	D	..	7	108	
J-7	Hobart Bishop		D	34.9	6	€c	588	23.1	9-12-61	M	D	61	7	182	Inadequate during dry season.

J-8	Paul K. McWhorter .	Hancock and Chesnut.	D	314	6	Cc	582	12.6	9-12-61	N	N	..	...	.....	Cased to 25-30 ft. Yield reported, 20 gallons per hour in 1956.
J-9	W. T. Harton.....	Hawthorne Well Drillers.	D	56	6	Cc	589	10.2	9-15-61	J	D	..	2	122	Cased to 46 ft.
J-10	V. E. Smith	Hancock and Chesnut.	D	45	6	Cc	601	11.8	9-11-61	J	D,P	..	32	332	Cased to 38 ft. Supplies 1 family and truck stop. Bedrock at 18 ft. and cavity 40 to 45 ft.
J-11	-- Bedwell	.....	D	.....	10	Cc	579	1.0	8-22-61	P	Irr	..	21	228	Supply used to water lawn. Former supply for town of Cedar Bluff.
J-12	Town of Cedar Bluff	H. W. Peerson Drilling Supply Co.	D	300	8-6	Cc	586	11.1	9-12-61	T	N	..	...	.....	Well 8-in. to 200 ft. and 6-in. 200 to 300 ft. Former supply for town of Cedar Bluff. See fig. 5, sample log in table 5, and driller's log in table 6.
J-13	...do	...do	D	375	8-6	Cc	578	15	1960	T	N	..	...	.....	Former supply for town of Cedar Bluff. See sample log in table 5.
K-1	R. B. Stancell	.....	Du	34.1	30	Cc	585	22.3	9-13-61	J	D,S	..	4	108	Lined with rock. Supplies 1 family and 22 head of stock.
K-2	T. F. Bouchillon...	.....	D	65	6	Cc	655	13.8	9-18-61	J	D	..	11	218	
K-3	John Richardson ...	Hancock and Chesnut.	D	70	6	Mf (?)	675	12.6	9-18-61	N	N	..	...	.....	Cased to about 50 ft. Yield reported, 6-7 gpm in August 1961.
K-4	Edward Black.....	Rogers Well Drillers.	D	108	6	Cc	680	54.9	9-18-61	J	D	..	4	152	
K-5	Robert Bishop and E. Early.	.....	D	50	6	Cc	646	5.4	9-18-61	J	D	..	4	242	Supplies 3 families. Flowed for several days after drilled.
K-6	W. J. Smith.....	.....	Du	25.1	30	Qal	621	16.3	9-18-61	M	D	62	7	20	30-in. terra-cotta casing to 25 ft.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
K-7	H. J. Chapman.....	.....	Du	19.5	24	Qal	609	13.2	9-18-61	M	D	60	18	28	
K-8	Joe Loveless.....	Hancock and Chesnut.	D	69	6	Qal	617	9.6	9-18-61	J	D	..	4	34	Cased to 69 ft.; slotted near bottom.
L-1	O. B. Wilson	Cherokee Well Drillers (?).	Du-D	64.1	24-6	Qal	586	15.1	11-21-61	J	D	..	2	24	Drilled within dug well. 24-in. casing to 18 ft.; 6-in. casing from 17 to about 29 ft. Supplies 2 families.
L-2	Mrs. Henrietta Poole Wade.	.....	Du	41.9	36	Qal	634	33.4	9-18-61	M	D	60	21	18	Supplies 2 families.
L-3	Alexis Junior High School	Hawthorne Well Drillers (?).	D	238	6	Qal	599	114.4	11-21-61	J	P	..	2	30	Supplies 102 students and 5 teachers.
L-4	P. H. Flynt	.....	Du	13.7	24	Qal	570	10.0	11-21-61	J	D	..	21	32	Inadequate during dry season.
L-5	J. D. Lindsey	.....	Du	23.1	36	Ꞓc	572	14.4	11-21-61	P	D	..	81	70	Not cased. More water since completion of Weiss Reservoir.
L-6	R. F. Lindsey	.....	Du	40.6	36	Ꞓc	627	26.6	11-21-61	P	D	..	2	64	Not cased.
L-7	Ruby Arnold.....	Hancock and Chesnut.	D	82.9	6	Ꞓc	635	45.9	11-21-61	M	D	62	4	130	
L-8	Joe G. Jennings....	.....	D	270(?)	6	Ꞓc	624	26	1959	P	D	..	113	602	Yields very little water.

L-9	Friendship Baptist Church.	.....	Du	12.3	18	Ec	593	10.0	11-21-61	J	D	..	14	194	
L-10	J. W. Graham	.....	D	32.3	6	Ec	596	2.2	12- 1-61	M	N	62	25	194	House burned.
L-11	Charles Rosser	Hawthorne Well Drillers.	D	60	6	Ec	611	15.2	12- 1-61	J	D	..	92	354	Cased to 40 ft. Will pump dry in about 6 hrs.
L-12	Alton Kerr.....	Michel Houston ..	D	64	5	Ec	627	8.6	12- 1-61	M	D	63	11	234	Supplies 2 families.
L-13	B. G. Twilley	Hawthorne Well Drillers.	D	40	6	Ec	630	6.8	12- 1-61	J	D	..	21	362	
M-1	Mrs. O. Jordan.....	.....	Du	17.5	30-24	Qal	584	13.9	11- 6-61	M	D	63	7	44	24-in. casing from 11 to 17 ft.
M-2	Mrs. Willie Smith...	Hancock and Chesnut.	D	90	6	Ec	602	26.1	11-14-61	J	D	..	21	174	Yield reported, 20 gpm in October 1961. Water enters at 40 ft.; very little below.
M-3	C. H. Pruett, Jr....	Cherokee Well Drillers.	D	.....	6	Qal	611	18.2	11-14-61	J	D	..	7	24	
M-4	Joe Newberry.....	.....	Du	17.1	36	Ec	675	14.0	11-14-61	M	D	63	152	58	
M-5	Albert Neyman.....	.....	Du	15.1	30-24	Qal	625	12.8	11- 6-61	J	D	..	7	16	24-in. casing from 9 to 15 ft.
M-6	R. L. Guice	.....	Du	20.3	24	Ec	612	10.6	11- 8-61	M	D	..	...	.....	
M-7	H. J. Bishop.....	Cherokee Well Drillers.	D	128	6	Qal	585	18.7	11-14-61	J	D	..	2	40	Cased to 37 ft. Supplies 2 families.
M-8	A. L. Steed	...do	D	103	6	Ec	585	8.8	11- 8-61	J	D	..	2	112	
M-9	Pruett's Fishing Camp.	...do	D	112	6	Qal	579	21.6	11- 8-61	J	P	..	7	34	Supplies store, service station, cafe, and fishing camp; inadequate at times.
M-10	E. S. Young	Hancock and Chesnut.	D	120	6	Ec	604	37.0	11- 8-61	J	S	..	4	70	Supplies turkey farm.
M-11	V. C. Singleton	.....	D	.....	6	Ec	680	26.9	11- 8-61	J	S	..	2	68	Supplies chicken farm.
M-12	Hoyt Jorden	.....	D	45.8	6	Ec	612	13.5	11- 8-61	M	D	63	78	244	
M-13	Powell Jorden	.....	Du	17.3	24	Ec	577	15.6	11- 8-61	M	D	62	25	252	Inadequate during dry season.
M-14	B. H. New	Hawthorne Well Drillers.	D	125	6	Qal	588	16.3	11-14-61	J	D	..	11	8	Yield reported, 4 gpm.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
M-15	Clyde H. West	Hawthorne Well Drillers.	D	99	6	€c	582	23.2	11-21-61	J	D	..	11	132	Original depth 61 ft.
N-1	John F. Ray	Hancock and Chesnut.	D	80	6	Qal	577	12.3	11- 6-61	J	D	..	2	22	
N-2	R. B. Baker	Hawthorne Well Drillers.	D	82	6	€c	577	13.3	10-26-61	J	D	..	4	78	
N-3	Donald Doey	Hancock and Chesnut.	D	100(?)	6	€c	596	12.5	10-26-61	N	N	..	...	.....	
N-4	Mrs. Tevis Burke ..	Rogers Well Drillers.	D	80	6	€c	.....	13.4	11- 6-61	J	D	..	32	80	
N-5	W. M. Hancock	Hancock and Chesnut.	D	112	6	€c	586	3.3	4-23-62	N	N	..	...	.....	Cased to 60 ft. Reported yield, 80 gallons per hour.
N-6	Joe Bob Smith	.....	Du	22.6	30	Qal	598	20.0	10-26-61	P	D	..	7	20	Not cased.
N-7	James Jackson	Hawthorne Well Drillers.	D	80(?)	6	€c	555	15	10- -56	J	D,P	..	4	58	Supplies 1 family and service station.
N-8	Lamar Lowe	.....	Du	17.3	24	€c	553	12.7	10-26-61	J	D	..	28	20	
N-9	Jack Norton	.....	D	47.7	6	€c	613	8.5	11- 6-61	M	D	65	4	206	
N-10	C. D. Steed	Hawthorne Well Drillers.	D	80	6	€c	638	18.1	11- 6-61	J	D	..	2	124	
N-11	Roy Grimes	Hancock and Chesnut.	D	84	6	€c	667	19.7	11- 6-61	N	N	..	...	.....	

N-12	Vance Stinson	...do	D	100	6	€c	576	2.0	1-31-62	J	D,S	..	18	122	Cased to 42 ft. Supplies 1 family and 8 head of stock.
N-13	R. W. Sentell	Rogers Well Drillers.	D	79	6	€c	551	11.5	10-24-61	J	D	..	Trace	80	
N-14	Frank Lowe	.....	D	85.2	6	Qal	563	17.9	10-24-61	J	D	..	7	56	
N-15	R. L. Vaughan.....	Hawthorne Well Drillers.	D	160	6	€c	578	4.4	1-31-62	J	D	..	25	342	Cased to 21 ft.
N-16	Jeff D. Jorden and Co.	.....	Du	25.3	24	€c	596	6.6	2- 7-62	J	D	..	71	112	24-in. terra-cotta casing to 24 ft.
O-1	Willie McDaniel....	.....	D	137	6	O€u	637	80.2	9-28-61	J	D	..	7	180	Cased to 122 ft. Yield reported, 20 gpm in 1954.
O-2	Mrs. M. Roberson ..	Rogers Well Drillers.	D	96	6	O€u	605	38.2	9-28-61	J	D	..	4	134	Cased to 90 ft.
*O-3	Tenn., Ala., and Ga. RR.	.....	S	.....	...	Mtm	612	.....	.....	F	N	61	2	138	Bristow Spring. Measured flow, 210 gpm on 5-10-55 and 250 gpm on 2-14-62.
O-4	Hoyt Mackey	Hawthorne Well Drillers.	D	82	6	€c	580	7.5	10-24-61	J	D	..	4	124	Yield reported, 40 gpm in 1954. Finished in limestone.
O-5	O. D. Chambers....	...do	D	135	6	€c	618	57.0	10-26-61	J	D	..	2	126	Cased to about 78 ft.
O-6	H. M. Mackey.....	...do	D	55	6	€c	575	16.0	10-18-61	J	D	..	2	124	
O-7	J. B. Rogers	Rogers Well Drillers.	D	.....	6	€c	601	.....	.....	J	D	..	7	176	
O-8	Mackey's Service Station.	...do	D	165	6	€c	604	25.1	10-18-61	J	Ind	..	2	174	
O-9	W. M. Smith	...do	D	116(?)	6	€c	577	13.8	10-18-61	J	D	..	35	140	Cased to 22 ft. Inadequate at times. Yield reported, 10 gallons per hour in 1951.
O-10	Alabama Power Co. Weiss Dam.	Alabama Power Co.	D	80	6	Qal	548	22	4-10-61	S	Ind	..	7	192	Cased to 39.5 ft.; slotted 29.5 to 39.5 ft. with 12-in. diameter gravel pack. Yield reported, 25-100 gpm in July 1961. See driller's log in table 6.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
O-11	Alabama Power Co. Weiss Dam.	Alabama Power Co.	D	80	6	Qal	548	19	6- 9-61	S	Ind	..	...	.....	Cased to 43 ft.; slotted 28 to 43 ft. with 12-in. diameter gravel pack. Yield reported, 30-90 gpm. See driller's log in table 6.
O-12	Joe R. Awbrey.....	Rogers Well Drillers.	D	200	6	Cc	611	20	1958	S	D	..	4	152	Yield reported, 60 gallons per hour in 1958.
O-13	Wayne Sewell.....	.....	D	65	6	Cc	611	14.9	10-23-61	J	D	..	4	78	
O-14	E. A. Higgins	Rogers Well Drillers.	D	90	24-6	Qal	616	21.1	10-23-61	J	D	..	4	22	Dug to 23.2 ft. and drilled from 23.2 to 90 ft.
O-15	Livingston Junior High School.	.....	D	186.9	6	Cc	558	14.5	10-23-61	J	P	..	4	220	Supplies 147 students and 8 teachers. Well no. 1.
O-16	...do	.....	D	.....	6	Cc	558	.....	.....	J	P	..	...	.....	Supplies 147 students and 8 teachers. Well no. 2.
O-17	Grady Miller.....	.....	D	50.9	6	Cc	558	5.2	10-23-61	M	D	..	...	.....	
O-18	Alabama Power Co. Weiss Dam.	Alabama Power Co.	D	80	6	Qal	559	12	4-18-61	S	Ind	..	4	68	Cased to 70 ft.; slotted 15 to 24 ft. with 12-in. diameter gravel pack. Supplies drinking and bathroom water for power house. Yield reported, 37 gpm for 8 hrs. in May 1961. See driller's log in table 6.

O-19	...do	...do	D	80	6	Qal	545	21	5- 8-61	S	Ind	..	2	108	Cased to 32.8 ft.; slotted 20 to 30 ft. with 12-in. diameter gravel pack. Supplies guest house. Yield reported, 40 gpm for 8 hrs. in May 1961. See driller's log in table 6.
O-20	B. F. Lancaster ...	Hawthorne Well Drillers.	D	122	6	Kc	585	22	9- -60	J	D	..	7	352	Cased to 23 ft. Yield reported, 5 gpm in September 1960.
O-21	Mrs. C. A. Burke ...	Rogers Well Drillers.	D	.....	6	Qal	602	23.5	10-23-61	J	D	..	4	36	Supplies 2 families.
P-1	Richard Sewell	.....	Du	19.3	24	Qal	582	16.7	10-23-61	M	D	62	4	10	
P-2	W. D. Hood	Hawthorne Well Drillers.	D	90	6	Qal	552	11.9	10-23-61	J	D	..	4	42	Supplies 2 families.
P-3	B. B. McKinney....	...do	D	78.4	6	Qal	563	16.0	10-23-61	J	D	..	4	26	
P-4	King Baker	Rogers Well Drillers.	D Du	65	30-6	Qal	575	11.0	3- 9-62	J	D	..	4	60	First drilled to 65 ft., then dug around 6-in. well to 25.7 ft. Yields little water. Inadequate during dry season.
P-5	Barrington Estate ..	.....	Du	20.9	36	Kc	562	5.2	3- 9-62	M	D	54	2	92	Rock lined.
P-6	Joe Burks	.....	Du	21.5	24	Qal	571	2.2	3-16-62	M	D	58	18	20	24-in. terra-cotta casing to 21 ft.
Q-1	-- Ellis	.....	Du	19.6	24	Kc	571	11.9	1-29-62	M	D	59	21	446	Terra-cotta casing.
Q-2	P. L. Hannah	Rogers Well Drillers.	D	40	6	Kc	562	2.6	1-31-62	J	D	..	4	80	Supplies 1 family and store.
Q-3	Mrs. Stella Graham .	.....	Du	12.7	30	Qal	550	2.6	3- 9-62	M	D	55	25	20	24-in. concrete casing from 3.5 to 12.5 ft.
Q-4	Mrs. Etta Patty	Rogers Well Drillers.	Du D	49.9	24-6	Kc	575	14.1	3- 9-62	M	D	60	18	98	24-in. terra-cotta casing to 25 ft.; 6-in. open hole below.

Table 4.—*Records of wells and springs in Cherokee County, Ala.* -Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
Q-5	S. C. Graham	J. L. Abernathy..	D	230	24-6	€c	560	3.0	1-31-62	J	D	..	35	174	24-in. terra-cotta casing to 18 ft., none below. Dug to 55 ft. and drilled from 55 to 230 ft.
Q-6	...do	...do	D	115	6	€c	560	1.4	1-31-62	N	N	..	...	.....	Yields very little water.
Q-7	Curtis Grimes	.....	Du	17.4	24	Qal	569	2.2	1-29-62	J	D	..	25	42	Cased to 17 ft.
Q-8	Mrs. Della Burnett..	.....	D	95	6	€c	575	20.4	3-16-62	J	D	..	50	222	Cased to 20 ft.
Q-9	G. F. Byram	.....	D	110	6	€c	596	9.0	1-31-62	J	D	..	103	726	
Q-10	J. W. Williams	.....	Du	18.0	60	€c	593	1.4	3-16-62	P	D	..	4	262	
Q-11	George Waldrop	.....	Du	19.3	36	€c	631	5.6	3-16-62	J	D	..	21	200	Lined with cement blocks.
Q-12	Mrs. R. S. Story....	Hancock and Chesnut.	D	80	6	€c	624	6.5	1-31-62	J	D	..	131	624	Cased to 21 ft. Supplies 2 families. Yield reported, 12 gpm in 1958.
Q-13	H. R. Whatley.....	...do	D	85	6	€c	615	6.5	1-30-62	J	D	..	14	192	Yield reported, 20 gpm in 1957.
R-1	Tom Jordan	.....	D	84.3	6	€c	633	10.7	11- 9-61	M	D	63	7	122	
R-2	...do	.....	D	60.8	6	€c	604	21.1	11- 9-61	M	D	62	2	180	
R-3	...do	.....	D	21.6	6	€c	575	12.3	11- 8-61	M	D	63	21	286	Water becomes muddy at times.

R-4	John Harold Anthony	Hawthorne Well Drillers.	D	77.9	6	Ec	589	25.4	11- 8-61	M	D	61	4	138	
R-5	Mrs. Doc Lindsey	.....	D	62.6	6	Ec	610	16.0	11- 9-61	M	D	62	4	168	
R-6	Ellis Brothers	Hancock and Chesnut.	D	72.3	5	Ec	616	22.6	11- 9-61	J	D	..	2	156	Will pump dry.
R-7	...do	.....	D	16.9	6	Ec	594	12.3	11- 9-61	M	D	63	50	344	
R-8	Mrs. J. E. McKinney	.....	D	39.3	6	Ec	581	21.3	3-16-62	M	D	61	46	676	Cased to about 20 ft.
R-9	Ellis Brothers	.....	D	54.3	8	Ec	606	17.7	11- 9-61	M	D	63	35	350	
R-10	John L. Ellis	Hancock and Chesnut.	D	120	6	Ec	636	28.8	11- 9-61	J	D	..	2	146	Cased to 11 ft. Yield reported, 35 gpm in June 1961.
R-11	Ellis Brothers	.....	Du	17.5	24	Ec	606	15.2	11-14-61	M	D	62	25	226	24-in. terra-cotta casing to 17 ft. Inadequate during dry season.
R-12	Burval Hilburn	.....	S	.....	...	Ec	672	.....	.....	F	D	60	2	198	Measured flow, 250 gpm on 2-15-62.
R-13	J. T. Bright	Hancock and Chesnut.	D	104	6	Ec	662	17.2	11-14-61	J	D	..	4	290	Cased to 100 ft.; slotted near bottom. Inadequate during dry season.
R-14	Mrs. Willie Jones	.....	Du	24.5	24	Ec	647	1.9	1-29-62	J	D	..	25	96	24-in. terra-cotta casing to 24 ft.
R-15	Joe Bedwell	.....	D	80	6	Ec	617	6.6	1-29-62	J	D	..	60	142	
R-16	Donald Williams and Emory Low.	.....	S	.....	...	Ec	626	.....	.....	F, J	D	60	4	98	Mountain Spring. Supplies 3 families. Measured flow, 580 gpm on 2-15-62.
R-17	J. T. Roberts	.....	S	.....	...	Ec	583	.....	.....	F, J	D	60	2	188	Coloma Spring. Measured flow, 300 gpm on 2-15-62.
R-18	Will Ellis	.....	Du	32.0	30	Ec	715	1.9	1-29-62	M	D	57	120	110	Not cased.
S-	Hardin Junior High School.	Hawthorne Well Drillers.	D	150(?)	6	Ec	636	18.4	12- 4-61	J	P	..	2	300	Supplies lunchroom and drinking water for 170 students and 6 teachers.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
S-2	Hardin Junior High School.	.....	D	325	6	€c	636	.....	.....	J	F	..	.....	.....	Supplies bathrooms; inadequate at times.
S-3	Providence Baptist Church.	.....	S	.....	...	€c	678	.....	.....	F	P	61	2	162	Supplies church. Measured flow, 260 gpm on 2-15-62.
S-4	H. M. Snead	Rogers Well Drillers.	D	40	6	€c	705	15.1	12- 1-61	J	D	..	11	204	Cased to 28 ft. Supplies 2 families and store.
S-5	Robert Browder	.....	S	.....	...	€c	679	.....	.....	F	S	60	2	300	Supplies several head of stock. Measured flow, 970 gpm on 2-15-62.
S-6	E. L. Conaway	Cherokee Well Drillers.	D	72	6	€c	756	21.4	12- 4-61	J	D,S	..	2	130	Supplies 1 family and 13 head of stock.
S-7	Jeff Lewis	Harvey Roden ...	D	92	6	O€u	788	68	1956	J	D	..	2	6	Cased to 92 ft.
S-8	W. C. Bearden	Rogers Well Drillers.	D	209	6	O€u	930	183.4	12- 4-61	J	D	..	2	62	Cased to 209 ft. Bauxite from about 80 to 130 ft. Seam of iron ore at about 208 ft.
S-9	Orbie Bishop	.....	Du	31.5	36	O€u	868	12.9	12- 4-61	M	D	60	4	12	
S-10	Sammy Rhinehart...	Kilgore and Ingram.	D	93	6	O€u	769	48.1	12- 4-61	J	D	..	2	78	Cased to about 63 ft.
S-11	Mrs. Ruth Thompson	Rogers Well Drillers.	D	186	6	O€u	830	98.1	12- 4-61	J	D	..	4	102	Drilled through layer of bauxite.

V-1	D. W. Gilmer.....	.....	S	.....	...	€w	1,100 est.	.....	.....	F	P	..	2	10	Log Hollow Spring. Supplies 40 families by gravity flow. Estimated flow, 50 gpm on 2-15-62.
V-2	E. F. Pope.....	.....	Du	33.6	24	€c	737	5.1	12-13-61	J	D,S	..	18	100	Cased to 33 ft. Supplies 1 family and 8 head of stock.
V-3	E. T. Welsh	Rogers Well Drillers.	D	.....	6	O€u	762	5.9	12-13-61	J	D,S	..	4	46	Supplies 1 family and 1,200 chickens.
V-4	L. L. Millican	.....	Du	41.7	42	€s	861	3.7	4- 2-62	J	D,S	..	14	40	Not cased. Supplies 1 family and 5 to 6 head of stock. Became almost dry in 1954.
V-5	T. J. Pope	Rogers Well Drillers.	D	76	6	€c	689	9.0	4- 2-62	J	D	..	4	146	Cased to 42 ft.
V-6	Harold Pope.....	Kilgore and Ingram.	D	100	6	O€u	773	51.8	4- 2-62	J	D	..	4	60	Cased to about 90 ft.
V-7	Floyd Boswell	Hancock and Chesnut.	D	160	6	O€u	820	20.3	4-10-62	J	D,S	..	4	62	Supplies 1 family and 6,000 chickens. Bedrock at about 135 ft.
V-8	E. H. Davis	...do	D	80	6	€s	797	12.2	4- 2-62	J	D,P S	..	11	76	Cased to 80 ft. Supplies 1 family, store, and 5 head of stock. Water contains excessive iron.
V-9	Edward J. Goss....	.....	S	.....	...	€w	920	.....	.....	F	D	57	2	8	Goss Spring. Supplies 1 family and store. Estimated flow, 50 gpm on 12-13-61.
V-10	Herman Dobbs	.....	S	.....	...	€w	908	.....	.....	F	D	58	4	6	Estimated flow, 40 gpm on 12-13-61.
V-11	Mrs. Sutie Hulsey ..	.....	Du	25.0	30	€w	948	7.1	4-10-62	J	D	..	2	24	Becomes low during dry season.
*W-1	Louie Gravinsteader	.....	S	.....	...	O€u	627	.....	.....	F	D	60	2	106	Sanford Spring. Measured flow, 2,500 gpm on 2-15-62.
W-2	Odis Parker	Hawthorne Well Drillers.	D	93	6	O€u	642	40	7- -61	J	D	..	...	.....	Yield reported, 5 gpm in July 1961.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
W-3	.....	.....	S	.....	...	O€u	631	.....	.....	F	N	60	2	134	Garvin (Cazey) Spring. Measured flow, 340 gpm on 2-15-62.
W-4	G. E. Pollard	.....	Du	30.5	24	€c	704	1.2	12-13-61	P	D	60	11	174	Cased to 30 ft.
*W-5	Spring Garden High School.	Hawthorne Well Drillers.	D	112	6	O€u	667	6.6	12- 4-61	J	P	..	4	166	Supplies 448 students and 17 teachers.
W-6	Neal Borden	Hancock and Chesnut.	D	254	6	€c	662	9.9	1-29-62	S	D	..	21	2,290	
W-7	C. B. Harbour	.....	S	.....	...	O€u	661	.....	.....	F, J	D	60	2	98	Harbour (Parker) Spring. Measured flow, 280 gpm on 2-15-62.
W-8	Mrs. Lillian Harper.	Hawthorne Well Drillers.	D	75	6	Mf (?)	682	11.9	4-10-62	J	D,S	..	4	174	Cased to 75 ft. Supplies 2 families and 6,500 chickens. See driller's log in table 6.
W-9	B. F. Mobley	Rogers Well Drillers.	D	112	6	€c	716	55	7- -61	J	D	..	4	158	
W-10	Paul H. Savage, Jr.	Cherokee Well Drillers.	D	190	6	€c (?)	708	31.9	12-13-61	J	D	..	2	172	Cased to 42 ft. Supplies 4 families.

W-11	P. H. Minton	Lloyd C. Green and Robert and John Westbrook.	D	1,025	8	O€u	710	12.7	4- 2-62	J	D,S	..	4	142	Drilled to explore oil. 10-in. surface casing to 48 ft. and 8-in. from 0 to about 300 ft.; none below. Well plugged 200-300 ft. from bottom. Supplies 1 family and about 70 head of stock. Yield reported, 50 gpm with 35 ft. of drawdown. See sample log in table 5.
W-12	R. W. Naugher	Rogers Well Drillers.	D	.....	6	O€u	676	11.1	1-29-62	J	D	..	4	188	
W-13	Frank J. Little	J. C. Dobbs	D	86	6	€c	658	8.3	2- 1-62	J	D	..	11	236	Cased to 65 ft.
X-1	Mrs. L. P. Wood ...	.....	Du	59.7	24	O€u	853	38.5	4-10-62	M	D	61	4	14	Cased to 59 ft. Supplies 2 families. Almost dry in 1954.
X-2	G. R. Vaughan	Hawthorne Well Drillers.	D	150	6	€c	636	1.9	1-30-62	M	D	60	4	62	Cased to 23 ft.
X-3	Carlos Sanford	.....	Du	30.0	30	O€u	745	2.8	1-30-62	J	D,S	..	11	28	Supplies 1 family and 35 hogs; inadequate during summer of 1961.
X-4	Louis D. Megnin ...	.....	S	.....	...	O€u	655	.....	.....	F, J	D,S	61	4	106	Hendon Spring. Supplies 4 families and 10 to 30 head of stock. Measured flow, 480 gpm on 2-15-62.
X-5	James F. Estes	Hawthorne Well Drillers.	D	103	6	€c	623	18.4	1-30-62	J	D,S	..	7	202	Cased to 37 ft. Supplies 1 family and 21 head of stock. Water enters at 83 ft.
X-6	E. H. Anderson	Hancock and Chesnut.	D	85	6	Mf (?)	630	4.0	1-30-62	J	D,S	..	7	28	Cased to 20 ft. Supplies 2 families, 70 hogs, and 43,000 chickens. Yield reported, 35 gpm in 1958.

Table 4.—*Records of wells and springs in Cherokee County, Ala.*—Continued

Well or spring	Owner	Driller	Type	Depth of well (feet)	Diameter of well (inches)	Water-bearing unit	Altitude of land surface (feet)	Water level		Method of lift	Use of water	Field determinations			Remarks
								Above (+) or below land surface (feet)	Date of measurement			Temperature (°F)	Chloride (Cl) (ppm)	Hardness as $CaCO_3$ (ppm)	
X-7	L. J. Williams	Hancock and Chesnut.	D	155	6	O€u	711	42.7	1-30-62	J	D	..	2	104	Cased to 140 or 150 ft.
X-8	Mrs. Myrtle Woolf ..	.....	D	83	6	O€u	723	2.4	2- 1-62	J	D	..	2	56	Supplies 2 families. Water becomes turbid after heavy rain.
Y-1	Edwin H. Estes	Fords Valley Well Drillers.	D	325	6	€c	569	6.0	1-30-62	J	D	..	46	244	
Y-2	...do	Hawthorne Well Drillers.	D	100	6	€c	569	.1	1-30-62	N	N	..	...	.....	Yields very little water during dry season.

Table 5.—*Sample logs of wells in Cherokee County, Ala.*

	Thickness (feet)	Depth (feet)
Well J-12		
Owner: Town of Cedar Bluff		
Driller: H. W. Peerson Drilling Supply Co.		
Conasauga Formation		
No sample	5	5
Limestone, light olive-gray; and moderate-yellow clay	5	10
Limestone, light olive-gray; dusky yellow shale; and light-gray clay	5	15
Limestone, light olive-gray and medium light-gray	10	25
Limestone, medium light-gray; and dusky yellow shale	5	30
Limestone, light olive-gray and medium light-gray; and dusky yellow shale	5	35
Limestone, medium-gray; and dusky yellow shale	5	40
Limestone, medium-gray; and dark-gray hard calcareous shale	10	50
Limestone, medium-gray and light olive-gray; and dark-gray hard calcareous shale	5	55
Limestone, medium-gray; and dark-gray hard calcareous shale	5	60
Limestone, medium-gray; dark-gray hard calcareous shale; and light-gray clay	5	65
Limestone, medium-gray; and medium-gray hard calcareous shale	5	70
Shale, medium-gray, hard, calcareous; and medium-gray limestone	5	75
Shale, medium-gray, hard, calcareous	5	80
Shale, medium dark-gray, hard, calcareous; and medium-gray limestone	5	85
Limestone, medium- to medium dark-gray; and medium dark-gray hard calcareous shale	5	90
Shale, medium dark-gray, hard, calcareous; and medium- to medium dark-gray limestone	10	100
Samples not available	200	300
Well J-13		
Owner: Town of Cedar Bluff		
Driller: H. W. Peerson Drilling Supply Co.		
Conasauga Formation		
No samples	40	40
Limestone, medium- to light-gray; light olive-gray shale; and crystalline calcite	5	45
Limestone, medium- to light-gray; light olive-gray and medium-gray shale; and calcite	5	50

Table 5.—*Sample logs of wells in Cherokee County, Ala.*—Continued

	Thickness (feet)	Depth (feet)
Well J-13—Continued		
Conasauga Formation—Continued		
Limestone, medium-gray; and light olive-gray, dusky yellow, and medium-gray shale	5	55
Limestone, medium-gray; light olive-gray and light-gray shale; and crystalline calcite	10	65
Limestone, medium- to light-gray; light-gray shale; and crystalline calcite	5	70
Shale, medium-gray, calcareous; medium- to light-gray limestone; and crystalline calcite	5	75
Limestone, medium- to light-gray; medium light-gray shale; and crystalline calcite	5	80
Shale, medium-gray and light olive-gray, calcareous; medium- to light-gray limestone; and calcite	10	90
Limestone, medium- to light-gray; and crystalline calcite	5	95
Limestone, medium- to medium light-gray; dark-gray calcareous shale; and crystalline calcite	5	100
Limestone, medium-gray; dark- to medium dark-gray calcareous shale; and crystalline calcite	10	110
Shale, dark-gray, calcareous; medium- to medium light-gray limestone; and crystalline calcite	10	120
Limestone, medium- to light-gray; medium-gray calcareous shale; and crystalline calcite	5	125
Shale, medium dark-gray, calcareous; medium- to light-gray limestone; and crystalline calcite	5	130
Limestone, medium- to light-gray; and crystalline calcite	10	140
Limestone, medium- to light-gray; dark-gray calcareous shale; and crystalline calcite	10	150
Limestone, medium- to light-gray; and crystalline calcite	10	160
Limestone, medium- to light-gray; medium dark-gray calcareous shale; and crystalline calcite	5	165
Shale, dark-gray, calcareous; and light-gray clay	5	170
Limestone, medium-gray; dark-gray calcareous shale; and crystalline calcite	5	175
Limestone, medium-gray; and crystalline calcite	5	180
Limestone, medium-gray; dark-gray calcareous shale; and crystalline calcite	15	195
Limestone, medium- to light-gray; and crystalline calcite	5	200
Limestone, medium-gray; dark-gray calcareous shale; and crystalline calcite	15	215
Limestone, medium- to light-gray; dark-gray calcareous shale; and crystalline calcite	15	230
Limestone, dark- to light-gray; and crystalline calcite	15	245
Limestone, medium- to light-gray; dark-gray calcareous shale; and crystalline calcite	5	250

Table 5.—*Sample logs of wells in Cherokee County, Ala.*—Continued

	Thickness (feet)	Depth (feet)
Well J-13—Continued		
Conasauga Formation—Continued		
Shale, dark-gray, calcareous; medium- to light-gray limestone; and crystalline calcite	5	255
Limestone, medium- to light-gray; dark-gray calcareous shale; and crystalline calcite	5	260
Limestone, medium- to light-gray; and crystalline calcite	15	275
Shale, dark-gray, calcareous; and medium-gray limestone	10	285
Shale, dark-gray, calcareous; and medium-gray limestone with calcite veinlets	5	290
Limestone, dark- to light-gray; and crystalline calcite	5	295
Limestone, medium- to light-gray; and crystalline calcite	25	320
Limestone, medium- to light-gray; very light gray shale; and crystalline calcite	5	325
Limestone, medium- to light-gray with calcite veinlets; and crystalline calcite	10	335
Limestone, medium-gray with white streaks; light-gray clay; and pyrite	15	350
Limestone, medium-gray; dark-gray calcareous shale; and pyrite	15	365
Limestone, medium- to light-gray; light-gray clay; and pyrite	10	375
Well W-11		
Owner: P. H. Minton		
Driller: Lloyd C. Green and Robert and John Westbrook		
(Samples described by Winnie McGlamery[1])		
Cambrian or Ordovician dolomites		
Quartz in the form of miniature geodes	30	30
Same with gray dolomite	20	50
Gray dolomite	8	58
Same with gray lime	12	70
Gray to pink and reddish tinged dolomite and limestone	12	82
Light gray dolomite	8	90
Same with pink tinged dolomite	5	95
Light gray dolomite	51	146
Light gray dolomite	54	200
Light gray dolomite	27	227
Medium gray dolomite	8	235
Gray dolomite	5	240
Gray finely crystalline dolomite	30	270
Same, medium and darker gray	12	282

Table 5.—*Sample logs of wells in Cherokee County, Ala.*—Continued

	Thickness (feet)	Depth (feet)
Well W-11—Continued		
Cambrian or Ordovician dolomites—Continued		
Gray dolomite	18	300
Medium gray dolomite	3	303
Gray dolomite	12	315
Medium and darker gray dolomite	15	330
Gray dolomite	97	427
Light gray dolomite	18	445
No sample	12	457
Light gray dolomite	8	465
No sample	2	467
Light gray to smoky dolomite	30	497
Same and dark gray shale with pyrite	33	530
Light gray and smoky dolomite	20	550
Smoky dolomite, crystallization much finer than sample above	40	590
Smoky colored dolomite	10	600
Light gray dolomite	30	630
Smoky dolomite	20	650
Smoky fine-grained dolomite	20	670
Smoky and medium gray dolomite	15	685
No sample	2	687
Smoky fine-grained dolomite	8	695
Smoky and dark gray dolomite	5	700
Smoky dolomite	5	705
No sample	1	706
Dark gray dolomite	9	715
Medium and dark gray dolomite	10	725
Dark gray to black dolomite	20	745
Same with light gray dolomite	15	760
Same and medium-gray dolomite	7	767
Gray dolomite	3	770
Gray dolomite with very dark streaks	16	786
Light gray dolomite	20	806
Same and dark gray dolomite	8	814
No sample	4	818
Light gray and dark gray dolomite	18	836
Light gray dolomite	7	843
No sample	2	845
Light gray and dark gray dolomite	10	855
Very dark gray dolomite	5	860
Same and light gray dolomite	13	873
Dark gray dolomite	6	879
Same and light gray dolomite	6	885
Light gray dolomite	6	891

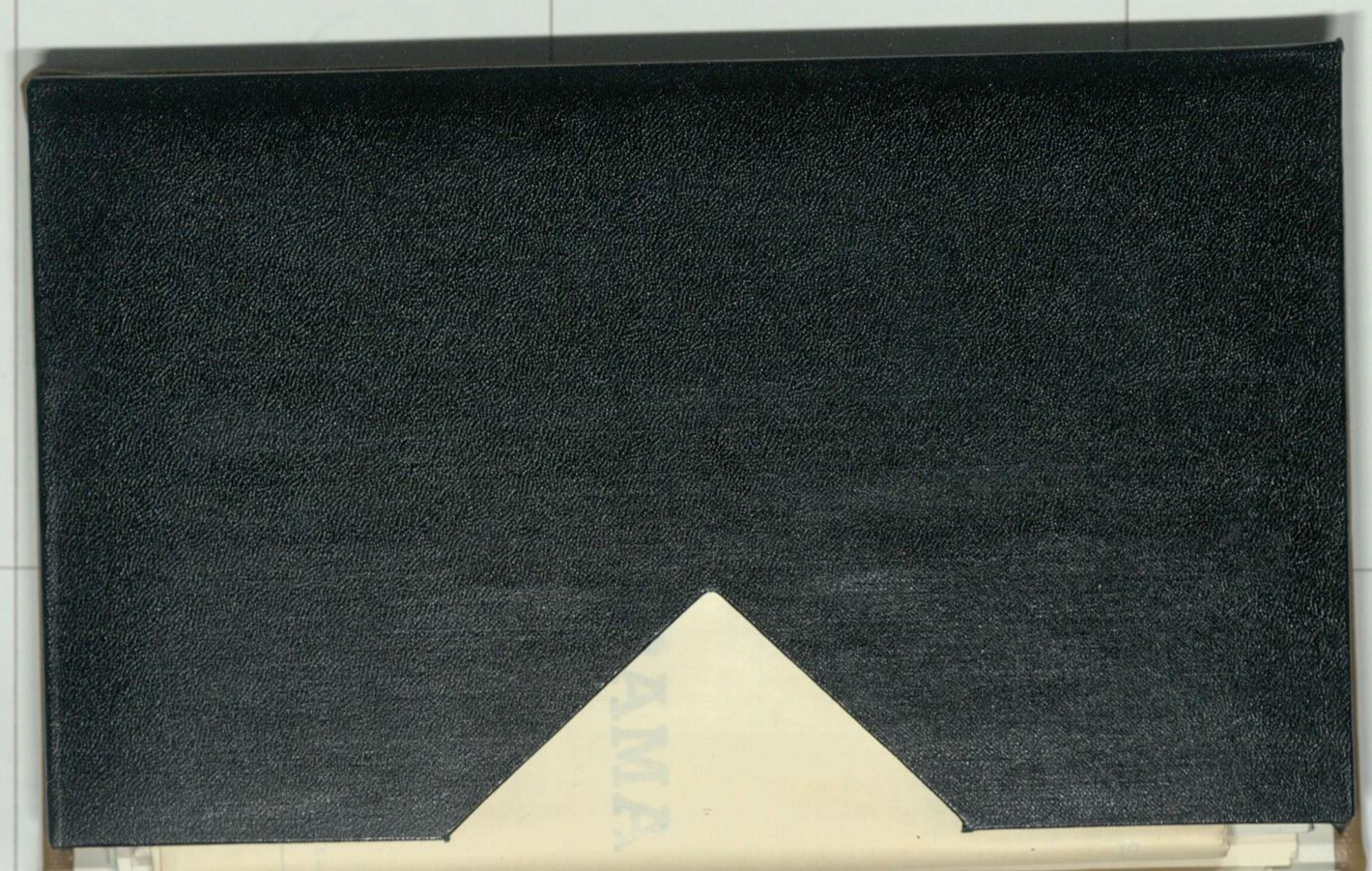
Table 5.—*Sample logs of wells in Cherokee County, Ala.*—Continued

	Thickness (feet)	Depth (feet)
Well W-11—Continued		
Cambrian or Ordovician dolomites—Continued		
Light gray and bluish dolomite	12	903
No sample	1	904
Bluish dolomite	7	911
Light gray and bluish dolomite	34	945
Same, cherty?	8	953
Gray dolomite with almost black chert	5	958
Gray to black cherty dolomite	3	961
Bluish gray dolomite	4	965
Gray coarsely crystalline dolomite	22	987
Light gray dolomite	14	1,001
Light gray coarsely crystalline dolomite	14	1,015
Gray dolomite	10	1,025

[1] Paleontologist, Geological Survey of Alabama

Table 6.—*Drillers' logs of wells in Cherokee County, Ala.*

	Thickness (feet)	Depth (feet)
Well E-3		
Owner: Ray Cecil Burkhaulter Driller: Rogers Well Drillers		
Clay with limestone boulders	50	50
Limestone	11	61
Cavity filled with white sand	5	66
Well J-12		
Owner: Town of Cedar Bluff Driller: H. W. Peerson Drilling Supply Co.		
Dirt and clay	7	7
Chert and boulders	8	15
Limerock	48	63
Shale and limestone	37	100
Limerock	38	138
Limestone	102	240
Limestone, soft	35	275
Limestone and flint	10	285
Limestone	15	300
Well O-10		
Owner: Alabama Power Co., Weiss Dam Driller: Alabama Power Co.		
Fill material	3	3
Clay, light brown with small amount of sand	14	17
Clay, gray with small amount of fine-grained sand and small gravel; gravel increasing in size at 25 feet	12	29
Shale, gray, hard	51	80
Well O-11		
Owner: Alabama Power Co., Weiss Dam Driller: Alabama Power Co.		
Fill	3	3
Clay, light brown with small amounts of fine sand	10	13
Clay, gray with small amounts of sand and scattered small gravel	6.5	19.5
Clay, gray with small amounts of sand; gravel increasing in amount but size remaining small	9.5	29

Table 6.—*Drillers' logs of wells in Cherokee County, Ala.*—Continued

	Thickness (feet)	Depth (feet)
Well O-11—Continued		
Shale, gray	51	80
Well O-18		
Owner: Alabama Power Co., Weiss Dam Driller: Alabama Power Co.		
Sandy clay, brown	12	12
Clayey sand and gravel	5.5	17.5
Shale, brown	2.5	20
Shale, gray	22	42
Sand, coarse grained, with small amount of clay and gravel	1	43
Shale, gray with limestone stringers	3	46
Shale, gray	34	80
Well O-19		
Owner: Alabama Power Co., Weiss Dam Driller: Alabama Power Co.		
Fill	5	5
Sandy clay, light brown	7	12
Sandy clay, brown, with scattered pea to 1-in. gravel	9	21
Sandy clay, brown, with increasing pea to 1-in. gravel	8	29
Shale, gray	51	80
Well W-8		
Owner: Mrs. Lillian Harper Driller: Hawthorne Well Drillers		
Soil and clay	17	17
Limestone	33	50
Broken limestone	25	75